EXTERNAL SCIENTIFIC REPORT

Collection of pesticide application data in view of performing Environmental Risk Assessments for pesticides[1]

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ABSTRACT

In response to the Regulation 1107/2009, The European Food Safety Authority (EFSA) funded a project to address cumulative exposure to plant protection products (PPPs) and the potential combined non-target effects of multiple applications of PPPs by means of carrying out surveys in eight EU Member States (MS), using a specifically designed survey form. The eight MS represent the Northern (Lithuania), Central (Belgium, Netherlands, Poland and United Kingdom) and Southern (Greece, Italy and Spain) regulatory zones. This project built upon on knowledge and experience of the previous EFSA pilot survey performed in six EU MS (CTF/EFSA/PPR/2010/04). Existing PPP usage surveys throughout the EU provide little information on how the products are applied by operators or details of mitigation measures used to reduce exposure (e.g. personal protective equipment), hours worked or specific times of application or other working activities performed by the operator that may contribute to the exposure. The PPP surveys in this project have collected in excess of 36,000 rows of information on a wide range of factors for operators such as the number of hours worked each day for specific the principle operator on over 400 farms, other worker activities, personal protective equipment (PPE) used and the details of 645 sprayers. The risk of exposure from combined toxicity resulting from the cumulative non-dietary exposure of operators to multiple active substances used for crop protection can be determined from such data. Together with the principal operator information, nine crops, some for direct consumption and some for processing, were selected and each MS collated information on 20 fields (one crop per farm) for between two and five crops, with at least two MS collecting information on each crop. These fields (582) were designated 'environmental fields' and information was collected on the multiple pesticide applications to that field in 2013 and, where possible, for the previous four years, together with information concerning in- and off- field margin characteristics.

KEY WORDS

cumulative, mixtures, pesticides, operator, worker, survey, exposure, PPE, conceptual model

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SUMMARY

In response to the Regulation 1107/2009, The European Food Safety Authority (EFSA) funded a project to address cumulative exposure to plant protection products (PPPs) and the potential combined non-target effects of multiple applications of PPPs by means of carrying out surveys in eight EU Member States (MS). The eight MS represent the Northern (Lithuania), Central (Belgium, Netherlands, Poland and United Kingdom) and Southern (Greece, Italy and Spain) regulatory zones. This current project built upon on knowledge and experience gained during the previous EFSA pilot survey performed in six EU MS (CTF/EFSA/PPR/2010/04) to collate information on cumulative non-dietary exposure. Pesticide application details have been collected for the principal spray operator on 419 farms, together with the entire spray details and margin information for nine crop types, some for direct consumption and some for processing designated 'environmental field'. Environmental field data were collected by each MS for 20 fields (one crop per farm) for between two and five crops types, with at least two MS collecting information on each crop type.

A farm questionnaire was designed which together with instructions to surveyors that used included lists for controlled terminologies was used by each MS. The questionnaire comprised a number of forms:

- Form 1 – cropping types and area grown in 2013
- Form 2 – farm business details including, size, location, number of spray operators and use of agronomists, buffer strips and Integrated Pest Management (IPM)
- Form 3 – pesticide application details for the principal spray operator on the farm, including date, crop stage, product, method of application, application rate, area treated, start time and duration of application.
- Form 3 (env) – pesticide application details for the environmental field which was collected the same information as Form 3 and off- and in-field margin information and all applications, not just the principal operator and where possible for the application details for the five previous years.
- Form 4 – information on the principal operator, age, gender, percentage spraying undertaken, qualifications, time and PPE worn during mixing and loading, PPE worn during application, time and PPE worn during sprayer cleaning and the PPE worn during other work activities that may contribute to their pesticide exposure
- Form 5 –details of the sprayers on the farm including make, model, age, tank capacities, filling systems, cab type, age and nozzle sets
- Form 6 – details of other work activities, including date, crop stage, time since last pesticide application, activity types and number of hours
- Form 7 – details of non-crop pesticide application including method of application, product, PPE, mass of product and duration.
- Form 8 – was a prompting sheet for exploring other worker activities

The consortium consisted of institutes from a range of EU MS giving a reasonable coverage of the principal EU climatic regions and cropping types, including representative MS from Northern, Central and Southern zones. Based on the existing and published data for cropping in each of the eight MS

carrying out the surveys, and to give a good range of crops in the project as a whole, nine crop types (for environmental fields) were agreed with EFSA (wheat, potatoes, oilseed rape, maize, sugar beet, apples, citrus, grapes and vegtables). Each crop type was included in a country where that particular crop is important nationally, and they cover a range of pesticide application techniques and worker activities. Each crop type was covered by between two and three MS and five MS for vegetables. Each MS selected farms based on existing guidelines (Thomas 2000) with farms from selected from a range of size categories.

Generally farms were contacted initially with a letter, followed up by phones calls to arrange farm visits to perform the survey. In the most cases one visit was not enough to collect all the required information, particularly when the principal spray operator of the farm undertook application on a number of farms, all of which needed collating. Emails and phone calls after the farm visits were needed to complete the data collection and in some cases some farmers refused to continue to participate part way through the project due to the amount of effort required. Thankfully this was rare as goodwill of the farmers to cooperate was pivotal for the success of the project. Capex2, a MySQL relational database with an Adobe ColdFusion web-based front-end, was made available to consortium members via the internet to allow data entry. Data entry was a labour intensive task since the quantity of information collected was greater than first anticipated. Once the data was input significant data error checking and correcting was undertaken to ensure the data quality was high. Table 1 provides a summary of the data collected during the survey. Information was collected for 414 principal spray operators, 580 environmental fields on 419 farms using 645 sprayers.

Table 1: Summary of the operator exposure and environmental data collated in study

Number of .. (Form number)	**BE**	**ES**	**GR**	**IT**	**LT**	**NL**	**PL**	**UK**	**TOTAL**
Farms (1)	37	60	75	81	31	29	61	45	419
Farms (2)	37	60	72	81	31	29	61	45	416
Fields – 2013 (3)	209	75	509	115	185	72	273	1376	2814
Fields – historical (3)	0	0	77	0	70	0	0	70	237
PPP applications – 2013 (3a)	2683	372	3231	1899	638	1411	1899	16770	28903
PPP applications – historical (3a)	0	0	2381	0	621	0	0	4453	7455
Environmental fields (3)	69	64	116	77	70	19	83	82	580
Principal operators (4)	36	60	72	81	31	28	61	45	414
Principal operator/sprayer usage (4a)	38	76	115	95	31	55	61	117	588
Principal operator PPE combinations (4b)	514	777	1242	5232	393	425	524	1148	10255
Sprayers (5)	38	78	118	103	31	58	87	132	645
Nozzle sets (5a)	63	79	129	160	78	100	125	204	938
Principal spray operators – work activities (6)	28	65	78	77	31	29	12	45	365
Principal spray operator detailed worker activities (6a)	1250	462	1859	454	280	443	32	1760	6540

Preliminary analysis of the collected data has been performed during this project and the subsequent report contains summary tables that provide information on the farms and pesticide application details collated during the project for 2013 and include:

- The average number of applications to the environmental fields per chemical class per crop type per country;
- Number of active substances and products used on each crop type per country;
- The top five active ingredients and formulated mixtures per crop type per county; and
- Summary of the sprayers encountered including capacities, boom widths and cab types.

Preliminary analysis of the operator exposure data was also performed to provide information on how the data collected can be interrogated to provide information on cumulative pesticide exposure of spray operators and includes:

- Information on spray operator age, experience and certification;
- Duration of pesticide application per country and per application method per country;
- Average daily exposure per active substance per farm per country;
- Number of active substances principal operators are applying per country;
- Duration spent mixing and loading and cleaning sprayers, per country;
- The PPE worn during per method of application per country; and
- The cab types on a method of application basis per country.

Three case-study farms were selected from three MS representing the Northern (Lithuania), Central (United Kingdom) and Southern (Greece) regulatory zones. For each farm specific details are describing the farms, principal operators, sprayers, crops grown and application schedule in 2013 and PPE worn are tabulated.

Preliminary analysis of the environmental field information was also performed and presented to provide information on how the data collected can be interrogated to provide information for use during environmental risk assessment and includes:

- The implementation of IPM practises per country;
- The presence of water course and drift prevention measures per country and per farm size;
- Average number of applications per crop per month; and
- Average number of applications per crop per chemical class.

Overall a large, unique and high quality dataset relating to pesticide application and usage has been collected from eight MS across three regulatory zones. Preliminary analysis of the data has been provided in this report but subsequently the dataset can be used to undertake more in-depth investigations of cumulative pesticide exposure to spray operators undertaking mixing and loading,

spraying and cleaning activities and in some cases this can be combined with other worker activities that will add to the exposure. Moreover the data collected on the environmental fields can be investigated and used to subsequently build environmental scenarios for the purposes of environmental risk assessment.

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BACKGROUND AS PROVIDED BY EFSA

The EFSA Panel on Plant Protection Products and their Residues (PPR) was tasked in December 2008 to revise the Guidance Documents on Aquatic Ecotoxicology (SANCO/3268/2001 rev.4 (final), 17 October 2002) and Terrestrial Ecotoxicology (SANCO/10329/2002 rev 2 final, 17 October 2002), resulting in the Mandates 2009-0001 and 2009-0002, respectively. Due to the complexity of the task, the revision will result in a series of updated Guidance Documents (GDs) covering different organism groups and spatial scales for the Environmental Risk Assessment (ERA) of pesticides.

Currently, the risk assessment for pesticide authorisation is mainly based on single substance assessment, however, in the environment different pesticides can be applied sequentially or as mixtures. In the current risk assessment it is assumed that if effects on non-target organisms occur and do not exceed a certain level, recovery from these effects will occur. This might, however, be impaired by multiple applications of pesticides, as they might have a combined action causing a lower or higher toxic effect than would be expected from knowledge about the single compound. The lack of knowledge on multiple applications of pesticides on the same crop and on crop sequence on one field in different areas of the EU makes it necessary to collect more information on it. Understanding the time frames (peak effects, recovery time) associated with the multiple applications of pesticides will help to develop a revised methodology assessing a realistic pesticide use scenario. Therefore, a pesticide use data collection is needed to investigate to which extent ecological recovery can be expected and considered in ERA. This information will provide an essential support to the revision of the GDs on Ecotoxicology.

In view of the ongoing revision of the GDs on Aquatic and Terrestrial Ecotoxicology (Mandates 2009-0001 and 2009-0002) it is needed to collect data on realistic pesticide use patterns in different crops or crop combinations in different areas of Europe. The pesticide use scenarios will then be taken into account when developing the risk assessment schemes for the aquatic and terrestrial compartment in order to give appropriate recommendations regarding the potential for ecological recovery in the revised GDs.

The project will use experience gained from a pilot study performed under CFT/EFSA/PPR/2010/04 “Collection and assessment of data relevant for non-dietary cumulative exposure to pesticides and proposal for conceptual approaches for non-dietary cumulative exposure assessment”2. The data model and procedures to support the data collection will be developed from the deliverables obtained in this project. Since the focus of this ongoing data collection is to follow operator and worker exposure and not aiming at observing pesticide input on a field over a growing season, an adaptation of the data collection approach will be needed. However, where possible the new data collection should cover as much as possible also additional data on non-dietary exposure assessment of operators to extend the ongoing pilot study data collection and in order to provide also input for future work of the PPR Panel in this field.

The call encourages the formation of consortia with partners covering several EU Member States to ensure the collection of Pan-European data.

TERMS OF REFERENCE AS PROVIDED BY EFSA

The target population for this survey is farms producing both crops for direct consumption and crops for processing in the three regulatory zones of the EU as defined in Annex I to Regulation (EC) 1107/20093. The two main aims of this call are: (i) to collect detailed data on real pesticide applications over a period of 1 year in order to gather information on overall pesticide input and application patterns on a field for different European countries and crop types. Where available, data for the preceding 4 years to the current data collection should also be gathered for the same selected field; (ii) to collect information relevant for non-dietary exposure of operators over the period of 1 year, such as information on application equipment and operator equipment. To reach the two main objectives, the surveys need to be designed such that (i) it will be possible to trace the pesticide use pattern on one agricultural field for one year (preferably up to 5 years) and (ii) it will be possible to trace all activities of pesticide application operators over a year also for activities not related to the same field surveyed for part (i). As a consequence the survey should consider the exposure to pesticides for two sampling units (i) fields of fruit trees, arable crops, grapevines, potatoes and vegetables and (ii) operators.

In order to gather the data, it will be necessary to perform farm surveys through personal interviews, covering field and cropping details, farm details, pesticide application details, application operator details, application equipment details. In the surveys, all types of pesticides (chemicals (i.e. herbicides, insecticides, fungicides, rodenticides, molluscicides, acaricides, nematicides, plant growth regulators), microbials, plant extracts etc. as covered in Regulation 1107/2009), as well as all types of pesticide treatments (including also use of treated seeds and pesticides applied at drilling, pre-drilling and pre- and post-harvest treatments to the soil) should be considered.

The data collected in this project should be submitted by the tenderer via the EFSA data collection framework (DCF). EFSA‟s Data Collection Framework (DCF) is a web interface accessible by most common web browsers through which data providers can submit data files. The system provides automatic feedback on errors in structure and content, and confirmation of successful submissions (http://www.efsa.europa.eu/en/datexsubmitdata/datexdatacollframework.htm).

The final deliverables of the call are a database containing the collected data as well as a report on the methodology used and on the evaluation of the collected data.

The tasks were as follows:

Task 1 - Kick-off tele/web conference with EFSA for any clarifications on scope and objectives on the call with participation of at least all key experts.

Task 2 - Finalise the questionnaire for data collection

The existing survey should be reviewed considering the objectives of this project and the crops to be covered in the survey. The survey should allow information on pesticide exposure to be obtained for both selected fields and selected spray operators for a full year. The survey should be designed to obtain the minimum dataset (included in the data model in Annex 7) plus additional information (e.g. field margins); this can be discussed at the kick-off-tele/web conference.

The questionnaire should cover fields such as e.g. mentioned below. Details can be found in the provided data model. The final list will be agreed in the kick-off tele/webconference.

- Cropping details: Country, region, sampled crop, area cropped/size of the field, characteristics of field margins, intended use of crops (e.g. direct consumption or processing)

- Farm details: Farm size, Pesticide application operators and their activities
- Pesticide application details: Product applied, application method, amount, area treated, dates and intervals of applications, complete composition of tank mixes, meteorological conditions, crop growth stage
- Pesticide Application Operator details: Age, gender, qualifications and training, protective equipment, time spent on application
- Pesticide Application Equipment details: Type of application, type of equipment

For all parameters consideration should be given to the use of controlled terminology where possible using international standards, which is partly addressed already in the provided data model.

Task 3 - Establish a sampling plan to select farms, field and operators for inclusion in the survey and establish the contacts with the farms.

In order to guarantee a representative sample for each crop/region, it is recommended to base the selection of farms on available data on areas grown with an individual crop. Based on these data specific regions where the specific crops are predominantly grown should be identified. It is intended to cover at least 1 country/region of the Northern regulatory zone and 3 countries/regions for each, the Central and Southern regulatory zone as defined in Annex I to Regulation (EC) 1107/2009. The selection of the farms for the survey should ensure a distribution over different farm sizes and include both farms producing crops for direct consumption and for processing.

Based on the sampling frame identified in the proposal the tenderer should develop a method to randomly select the farms from the sampling frame according to the criteria described above.

A minimum of 400 surveys is expected and for each crop at least each 20 farms in 2 different countries should be surveyed.

Methods to ensure a high response rate for the survey should also be developed

Task 4 - Submit interim report 1 covering all methodology and documentation related to tasks 2+3.

This should include a detailed survey protocol and instructions to interviewers

A physical meeting at EFSA in Parma with the key experts should be held to agree on the methodology with EFSA.

Task 5 - Based upon the proposed questionnaire the data model for data submission should be agreed with EFSA including the controlled terminology lists to be used in the survey (free text responses must be kept to a minimum). According to the agreed data model a test data submission in XML format should be performed. EFSA will provide support (if needed) in the generation of the dataset in XML format.

Task 6 - Start performing the farm surveys by interviews and entry of collected data (see task 11 for details).

On site farm surveys should be performed in the language of the respective farmers. It is suggested to contact farms at the beginning of the year to explain the survey and collect the data for objective (i) regarding pesticide application patterns on one field over the last 4 years where possible. It is

suggested further to collect the data for objective (i) for the current survey year (2013) as well as data for objective (ii) on operator exposure towards the end of the year.

Task 7 - Submit interim report 2 covering the status of farm survey activities in the different areas (i.e. a list of farms surveyed, overview of data collected), status of data entry, and listing problems encountered including of measures taken or proposed to overcome eventual problems.

A tele/web conference should be held to discuss the status with EFSA.

Task 8 - Finalise the farm survey interviews.

Task 9 - Submit Interim report 3 covering an overview of data collected and progress on quality check and data analysis containing also an outline of the final report.

A physical meeting at EFSA in Parma with the key experts in order to discuss the report.

Task 10 - Complete data entry, data quality check and submission to EFSA via the EFSA data collection framework.

The applicant should perform the standard data management checks for correct data type, compliance with controlled terminologies, completion of mandatory fields. In addition the data should be checked for scientific plausibility.

Gathered data should be analysed to derive pesticide application scenarios for the selected crops.

The validated data should be submitted to EFSA via the DCF in XML format. This will be subject to validation checks by EFSA including testing the reproducibility of analyses provided in the Interim and Final reports prior to acceptance.

Task 11 - Preparation of the final report summarising the methodology for data collection and the data analysis (e.g. identifying application scenarios for the different crops; operator activity profiles; description of data gaps and uncertainties).

This contract/grant was awarded by EFSA to:

Contractor/Beneficiary:	The Food and Environment Research Agency (Fera) Sand Hutton York YO41 1LZ United Kingdom
Contract/grant title:	Collection of pesticide application data in view of performing Environmental Risk Assessments for pesticides
Contract/grant number:	CFT/EFSA/PRAS/2012/05

INTRODUCTION AND OBJECTIVES

1.1. Introduction

In response to the Regulation 1107/2009, The European Food Safety Authority (EFSA) funded a project to address cumulative exposure to plant protection products (PPPs) and the potential combined non-target effects of multiple applications of PPPs by means of carrying out surveys in eight EU Member States (MS), using a specifically designed survey form. The eight MS represent the Northern (Lithuania), Central (Belgium, Netherlands, Poland and United Kingdom) and Southern (Greece, Italy and Spain) regulatory zones. This current project built upon on knowledge and experience gained during the previous EFSA pilot survey performed in six EU MS (CTF/EFSA/PPR/2010/04) to collate information on cumulative non-dietary exposure.

Whilst PPP usage surveys are performed in some countries in the EU (e.g. Lithuania, Poland and United Kingdom), these provide little information on the multiple PPP non-dietary exposure of operators or the realistic multiple pesticide exposure scenario non-target organisms are exposed to. Therefore this project collated data on:

- how PPPs are applied by operators;
- details of mitigation measures used to reduce exposure (e.g. personal protective equipment, design of the sprayer cab, qualifications);
- hours spent by a farm principal operator applying PPP active ingredients;
- specific times of application;
- other working activities that may contribute to the exposure;
- the PPP application profile for specific crops in specific fields; and
- the in- and off-field boundary characteristics of specific crops.

419 farms across eight MS have been surveyed by the project consortium. A web-based database specifically developed for this purpose (Capex2), has been developed to allow data to be entered remotely by each member of the consortium collecting pilot survey data, with the database available for access by EFSA. The database contains in excess of 36,000 rows of PPP application information. Whilst the volume of data collated is large it will not be representative of all farms across the sampled regions, and the data could not be used to make either regional or national estimates of pesticide usage. The data was collected in order to improve models of operator cumulative exposure and the support the revision of ecotoxicological guidance documents; it was not intended to produce national estimates of pesticide usage.

1.2. Overall Objectives

The overall objective of this project was to collate detailed data on real pesticide applications from farms producing crops for direct consumption (such as potatoes and wheat) and crops for processing (such as oilseeds and sugar beet) in the three regulatory zones of the EU as defined in Annex I to Regulation (EC) 1107/2009. The main aims of the project were:

a. To collect detailed data on real pesticide applications over a period of 1 year in order to gather information on overall pesticide input and application patterns on a field for different

European countries and crop types. Where data are available, they will be collected for the preceding 4 years to the current data collection for a selected field.

b. To collect information relevant for non-dietary exposure of operators over the period of 1 year. This would include application parameters relating to the equipment and application technique as well as the personal protective equipment (PPE) and operator behaviour and training.

The surveys will therefore be designed to:

a. Collect data on the pesticide use on one carefully selected representative field on each farm surveyed for one year with additional data for the previous 4 years; and

b. Collect records of all activities of principal pesticide application operators over one year to include pesticide application related activities on the whole farm or on other farms where operators may also apply pesticides as well as other worker activities.

The surveys will therefore provide data for the exposure to pesticides for two sampling units:

a. Fields of fruit trees, arable crops, grapevines, potatoes and vegetables; and

b. Operators.

The data was collected with farm surveys through personal interviews, covering field and cropping details, farm details, pesticide application details, application operator details, application equipment details. In the surveys, all types of pesticides (chemicals (i.e. herbicides, insecticides, fungicides, rodenticides, molluscicides, acaricides, nematicides, plant growth regulators), microbials, plant extracts etc. as covered in Regulation 1107/2009), as well as all types of pesticide treatments (including also use of treated seeds and pesticides applied at drilling, pre-drilling and pre- and post-harvest treatments to the soil) were considered. Some required data was captured through follow-up letters, emails and telephone conversations.

1.3. Specific Objectives

a. Design a standard format questionnaire to be used to collect new data in surveys in a number of regions across the EU. This will provide robust complete data sets for the use of PPPs and the activities of operators on farms. All data will be added to a database designed specifically for the task, which allow output in XML, XLS or CSV formats;

b. Collate data available for PPP usage and information on a minimum of 400 sample farms across all zones of the EU relevant for use in environmental risk assessments (ERAs). For each crop at least 20 farms in two different countries will be surveyed. The selection of farms will be based on available data on areas grown with an individual crop, to identify specific regions where the specific crops are predominantly grown. The selection of the farms will be stratified across the European zones, different farm sizes, and both farms producing crops for direct consumption and for processing;

c. Collate data available for operator (including contractors) behaviour and use of protective measures on farms across all zones of the EU relevant for use in human and environmental risk assessments; and

d. Review of all data collated and generated in the project for ERA, identifying and quantifying sources of uncertainties.

1.4. Workpackages (WP)

WP1 Design survey questionnaire appropriate for ERA and operator non-dietary exposure assessment

WP2 Select crops and farms to be used in the surveys

WP3 Carry out surveys of PPP usage for ERA and operator details

WP4 Design database

WP5 Assessment of the collected data with regard to ERA

WP6 Assessment of the data for operators

WP7 Reporting and analysis

2. Materials and Methods

2.1. Design of the farm survey

2.1.1. Define categories and terminology

Lists for controlled terminologies used in the project were established which were used in conjunction with the instructions to surveyors (Appendix A). The list was based on international standards and agreed or published terminology to ensure compatibility, and includes terms used in the pick lists of the survey questionnaire, in addition to information to support the project, to avoid ambiguity in the use and understanding of terms related to pesticides and application technology. Some of the controlled terminology in the survey form is presented below, with further information for the list of terms used in the project presented in more detail in the following as Appendices:

Appendix A Instructions to surveyors

Appendix B Abbreviations

Appendix C Glossary of general terms

Appendix D Terms related to type of application equipment / method for plant protection products (NPTC, 2010)

Appendix E List of pesticide formulation types and international coding system OECD Monograph Guidance – March 2001

Appendix F Crop Groups in Annex I of Regulation 600/2010 (ANNEX I)

2.1.1.1. List of crop type and crop stage

The list of crop types and common agronomic practices was developed with the tasks associated with worker exposure. For the survey questionnaire the crops followed the classification in the Regulation 600/2010 (ANNEX I) published in EN 9.7.2010 Official Journal of the European Union L 174/18. This list was developed for the crop classification of pesticide residues in food, and required slight modification during the project.

The crop type (survey type) was recorded using the following controlled terminology:

WH = Wheat
OS = Oilseed
SB = Sugar beet
PO = Potatoes
CI = Citrus
AP = Apples
MA = Maize
VI = Vines
VG = Vegetables
AR = Arable crop combinations including wheat, oilseed rape, sugar beet and potatoes

The crop stage was recorded using the following controlled terminology:

BP = Before planting
D = Dormant
PE = Pre-emergence
UT = Under table
F = Field
CD = Crop destruction
BH = Before harvest
TR = Transplanting treatment
AS = At sowing
FC = Failed crop
PR = Propagation area
NC = Non-crop areas

AH = After harvest
FB = Fabric
OG = Outside greenhouse
IR = Inter row
TB = Tree base
BS = Barren strips
BI = Bine defoliant
YA = Yard
GV = Gravel

2.1.1.2. List of possible operator activities

For the operator there were four task types considered:

ML = Mixing and loading
CL = Cleaning the sprayer
AP = Pesticide application
WA = Work activities

The method of application was recorded using the following controlled terminology:

HD = Hydraulic boom (downward)
HA = Hydraulic boom with air assistance (downward)
TH = Tunnel hydraulic sprayer no air assistance
VH = Variable geometry boom (hydraulic)
SB = Shrouded hydraulic boom (horizontal)
KN = Lever operated/pressurised knapsack
GU = Spray gun
GA = Gantry sprayer
PT = Paint
DR = Drench (soil drench)
FO = Fog
MS = Mist
VB = Vertical boom
GI = Granules incorporated (vehicle mounted)
FU = Fumigant
ST = Seed treatment
AE = Aerial application
MB = Molluscicides broadcast (vehicle mounted)
MI = Molluscicides incorporated (vehicle mounted)
SD = Seed drum
AA = Air assisted sprayer
TO = Tower sprayer
BA = Broadcast air assisted sprayer
TA = Tunnel air assisted sprayer
VA = Variable geometry boom (air assisted)
RA = Rotary atomiser (horizontal)
WW = Weed wiper
MK = Motorised knapsack
LA = Spray lance
IL = Irrigation line
DP = Dip
DU = Dust
SM = Smoke
GL = Herbicide glove
GB = Granules broadcast (vehicle mounted)
HG = Hand applied granules
SS = Soil sterilisation
VC = Vertebrate control/repellent
HM = Hand applied molluscicide
GS = Ground spray
WC = Watering can
MF = manually folding boom
SI = Soil incorporated

The worker activity was recorded using the following controlled terminology:

IM = Inspection/maintenance
SS = Sowing seed
RS = Removing shoots
VT = Vine training
CT = Cutting
HA = Handling
ER = Earliest re-entry time
MH = Mechanical harvest
MP = Mechanical pruning
TH = Thinning
PO = Potting
GR = Grafting
LR = Leaf removal
ST = Sorting
IN = Inspection
LW = Lifting wires
WE = Weeding
BR = Bud rubbing
PT = Propping/training branches
SH = Seed handling time
SR = Summer pruning
WI = WBF inspections
WB = Wild oat pulling
CL = Cleaning plant parts
PU = Pulling weed beet
EM = Earliest slug pelleting
ES = Earliest spraying

EF = Earliest re-entry – fungicide
EI = Earliest re-entry – insecticide
RN = Removing nozzles
MC = Manual cultivation
SU = Supervising thinning
PF = Ploughing/pressing
FS = Fertiliser spreading & spraying
VC = Vertebrate control measures
BG = Crop inspection – blackgrass
SM = Sprayer maintenance
CU = Cultivations – mechanical
MS = Mixing & loading solids
PG = Planting/gapping up
FL = Fertiliser activities
LF = Manual lifting
GB = Grubbing
MO = Mowing
CR = Crop rogueing
PR = Pruning
LI = Liming
WA = Watering
WP = Winter pruning
PL = Planting
HR = Harrowing
IT = Inspecting traps
PK = Packaging
PI = Picking
IA = Inspection/Maintenance + Agronomist
TC = Taking cuttings
RF = Removing flowers
RO = Rolling
DL = Drilling/filling
RU = Rodenticide use
SP = Supervising picking
WW = Wire work on hops
MI = Monitoring insect traps
PM = Managing picking
CC = Cleaning pesticide containers
ML = Mixing & loading liquids
CL = Cleaning the sprayer
AW = All areas of work
TD = Other tractor work (carting & storing grain from harvest)

2.1.1.3. List of cab type and personal protective equipment

The details of the protective equipment worn by both operators and workers were recorded using the controlled lists below for both CE marked chemical protective clothing and work wear.

For the sprayer cab, five types were considered:

CF = Carbon filter
NO = No cab
CA = Cab with no filter
CL = Closed cab
OP = Open cab

The personnel protective equipment was recorded using the following controlled terminology:

Gloves

GN = Nitrile
GE = Neoprene
GL = Latex
GO = Gloves other
GV = Vinyl
GF = Fabric/Leather
GB = Butyl Rubber
NO = none
GR = Non-specified rubber
GT = Viton
NL = Nitrile latex
NU = not used

CE marked chemical protective clothing

C1 = Type 6 (e.g. Tyvek Classic/Kleeguard T56)
C2 = Type 4 (taped/overlapping seams)
C3 = Type 3 (non-breathable)

General work wear (not CE marked chemical protective clothing)

C4 = Work wear: breathable (cotton/polyester)
C5 = Work wear: rainwear 2 piece (vinyl, Goretex etc.)
C6 = Work wear: rainwear 1 piece (vinyl, Goretex etc.)

Respiratory protective equipment

RH = Disposable filtering half mask
RV = Valved filtering half mask
RR = Half mask, reusable with filters
RF = Full face mask
RP = Power-assisted

Other items

FS = Face shield
BB = Bib and brace
HT = Hat
SH = Shorts
SG = Safety glasses
CT = Coat – padded
TR = Trainers
AP = Apron
LB = Leather/fabric boots
TS = T-shirt
LT = Full length trousers
LC = Long clothes
CH = Crash helmet
GG = Goggles
WL = Waterproof leggings
RB = Rubber boots
LS = Long sleeved shirt
NG = Normal glasses
SC = Short clothes
NW = Normal workwear

2.1.1.4. List of possible in- and off-field characteristics

For one field of each of the sampled crop types on a farm it was necessary to collect detailed environmental data regarding in- and off-field characteristics. An Environmental version of Form 3 was used for this purpose.

The following is the description included within the Instructions to Surveyors (Appendix A) for the inclusion of the different types of margins surrounding the Environmental fields; also included is additional information on margin definitions:

It was important to collect as much information as possible regarding the area immediately surrounding the Environmental field. In order to do this an assessment was made of the perimeter of a field by expressing each off-field/in-field combination as a percentage of the total. The total percentage should add up to 100.

Please see the example below:

	OFF-FIELD	IN-FIELD	WIDTH (m)	PERCENTAGE
COMBINATION 1	DI	SM	6	35
COMBINATION 2	OF	NM	0	10
COMBINATION 3	HD	NM	0	55
COMBINATION 4				

The width column refers to the width of the "in-field" buffer strip.

Off-field characteristics

Off-field characteristics are those surrounding a field; either (semi-)natural habitats with high ecological value (such as a hedgerow or woodland) or simple structures (fence or bare strip of land); there are normally no short-term changes in cultivation and in most cases they are not influenced by the farmer. Other off-field categories comprise man-made structures, e.g. an adjacent field, roads and ditches. This information was recorded using the following terminology:

OF = Other field
RO = Roads and other artificial structures
HD = Hedgerow
PA = Pasture (grassland)
FA = Fallow field
WO = Woodland, spinneys, copses, forests etc.
WB = Wind break
DD = Dry ditch
DI = Ditch
RI = River
ST = Stream
PO = Pond
LA = Lake
BD = Buildings
DY = Dyke
TR = Track, drove etc.
MD = Main drain
BA = Bank
GR = Sown grass
OR = Orchard
FI – Arable field
HI = Hedge/ditch
FP = Footpath
GV = Grass verge
HY = Hedge/dyke
DH = Dyke/hedge
MA = Maze field
GA = Game cover
GS = Grass strip
YD = Yard
HR = Hedge/dry ditch
GF = Grass field
OP = Pear orchard
CT = Concrete track
PI = Pit
CR = Concrete runway
GD = Gardens
FC = Field corner – pollen & nectar mix
BH = Bridleway/hedge
DR = Ditch/road
YI = Yard/ditch
CP = Chalk pit (scrub)

In-field characteristics

The type of in-field margin was recorded using a series of two character codes and it's width in metres. In-field structures are characteristically a piece of cropped land, managed typically by one farmer.

In-crop margins are normally areas that remain unsprayed, either by all active substances, or by selected active substances such as chlorpyrifos applied to apples in the United Kingdom. Here the outer edge of the apple orchard remains untreated with chlorpyrifos in order to prevent drift into neighbouring habitats, including watercourses.

Buffer strips are defined as in-field, cropped or uncropped zone of a defined width at the edge of a field which is influenced by the farmers action (e.g. spray drift). The buffer strip can be enforced by authorities, for example if it is part of an agri-environment scheme and has prescribed management actions in order to meet the off-field specific protection goal (for example spray drift onto watercourses). In addition, buffer strips may provide a recovery potential for the cropped areas.

The buffer strip is located in-field and has the same protection goals as the in-field area plus the functions to mitigate exposure of the off-field area if there is no suitable off-field habitat. The off-field protection goal is independent from the actual type of off-field habitat of individual fields.

A number of categories of in-field margins were identified in the initial set of instructions (see below). However, please see Appendix J Table J3 where the full range of the in-field and off-field margins information is provided.

HM = Herbaceous margin
SM = Sown or planted margin
WM = Woody margin
NR = Natural regenerating margin
MM = Several (mixed) margin types combined
NM = No margin
TR = Track
WD = Woodland
PN = Pollen & nectar
IC = In crop margin

For all in-field margins an estimate of the width was made, although no information on the management of the in-field margin was collected.

The use of in-crop margins was rarely exercised for all pesticide applications to a field and in most cases applied to specific active substances or spray-rounds. As it was a transient margin details of its use (the width of in-crop margin) were recorded within the pesticide application details in Form3. It was therefore not used in estimating the percentage of different types of margins surrounding the perimeter of the field.

All other in-field margins (excluding in-crop) were expressed as a percentage of the perimeter of the field, with all percentages adding up to 100.

2.1.1.5. List of formulation types and nozzles types

The formulation type was recorded using the following controlled terminology:

AB = Grain bait
AE = Aerosol dispenser
AL = Other liquids to be applied undiluted
BB = Block baits
BR = Briquette
CB = Bait concentrate
CG = Encapsulated granule
CS = Capsule suspension
DC = Dispersible concentrate
DP = Dustable powder
DS = Powder for dry seed
EC = Emulsifiable concentrate
ED = Electrochargeable liquid
EO = Emulsion, water in oil
ES = Emulsion for seed treatment
EW = Emulsion, oil in water
FD = Smoke tin
FG = Fine granule
FK = Smoke candle
FP = Smoke cartridge
FR = Smoke rodlet
FS = Flowable concentrate for seed treatment
FT = Smoke tablet
FU = Smoke generator
FW = Smoke pellet
GA = Gas
KN = Cold fogging concentrate
LA = Lacquer
LS = Solution for seed treatment
MG = Microgranule
OF = Oil miscible flowable
OL = Oil miscible liquid
OP = Oil dispersible powder
PA = Paste
PB = Plate bait
PC = Gel or paste concentrate
PR = Plant rodlet
PS = Seed coated with a pesticide
RB = Bait (ready for use)
SB = Scrap bait
SC = Suspension concentrate
SE = Suspo-emulsion
SG = Water soluble granules
SL = Soluble concentrate
SO = Spreading oil
SP = Water soluble powder
SS = Water soluble powder for seed treatment
SU = Ultra low volume (ULV) suspension
TB = Tablet
TP = Tracking powder
UL = Ultra low volume (ULV)
VP = Vapour releasing product

GB = Granular bait
GE = Gas generating product
GG = Macrogranule
GP = Flo-dust
GR = Granule
GS = Grease
HN = Hot fogging concentrate
WS = Water dispersible powder for slurry seed treatment application
WG = Water dispersible
WP = Wettable powder
XX = Others
OD = Oil dispersion
ME = Micro-emulsion
ZC = A mixed formulation of CS and SC

The nozzle type was recorded using the following controlled terminology:

FF = Flat Fan
AI = Air Inclusion
TJ = Twin Jet
HC = Hollow cone
UN = Unknown
PB = Pneumatic spreader blades
OC = Off centre spray tips - herbicide applications
UM = Umbrella - fertiliser nozzle
TE = Tee Jet
SP = Shear plate
RA = Rotary atomiser
FJ = Field jet
FC = Full cone

2.1.2. Consideration of EFSA opinions and reports

The Scientific Opinion on Preparation of a Guidance Document on Pesticide Exposure Assessment for Workers, Operators, Bystanders and Residents by the EFSA Panel on Plant Protection Products and their Residues (PPR); EFSA Journal 2010;8(2):1501. [65 pp.].doi:10.2903/j.efsa.2010.1501EFSA Journal 2010;8 (2):1501 has been taken into account for the definitions and terminology lists. This opinion defines the terms "operator" and "worker" and provides details of the scientific basis which should be used to perform assessments of the exposure to individual substances resulting from their application.

The coding of the crops types was taken from the following document: Data Collection of Existing Data on Protected Crop Systems in the European Member States – Coding Manual. EFSA Journal 2010; 8(3):1568 [81 pp.]. doi:10.2903/j.efsa.2010.1568.

2.1.3. Questionnaire design, data collection and data entry

A detailed questionnaire (Appendix G) used in the survey of the principal spray operator on each farm was developed by expanding the survey forms used for the pilot study in 2011 (Glass *et. al.,* 2012). This had originally used the expertise from previous surveys carried out by Fera in the UK to survey PPP usage and working practices for operators and workers (Garthwaite 2002, Garthwaite 2004a, and Garthwaite 2004b). However, the survey form for this EFSA project differs from existing Fera survey forms, and the approach was significantly different from that used in the pilot study. In particular additional data on the individual farmer or growers approach to Integrated Pest Management were collected; as was field margin data and historical pesticide usage on selected fields on each farm.

However, the main thrust of the survey was to ascertain the extent of an individual operator's exposure during a 12 month period. This included not only spray applications made to the sampled farm but to all farms sprayed by the operator. In addition other pesticide applications, primarily PPP's, but also biocides were included in the study. PPP usage also included non-crop areas, such as roadways, the farm yard, gravel drives, grain stores and barren strips. Biocidal usage was confined primarily to rodenticide usage and some insecticide usage for bed bugs.

2.1.3.1. Data collection – forms and data entry screens used

The main aim of the study was to collect detailed data on the PPP applications and operator exposure on a range of farms across eight MS in the EU (Belgium, Greece, Italy, Lithuania, Netherlands, Poland, Spain and United Kingdom). In addition environmental data and historical pesticide usage on selected fields on each farm were also collected.

Detailed instructions for surveyors and the paper forms used by surveyors on farms can be found in Appendices A and G, respectively. Detailed lists of controlled terminologies for worker activities, crop names, crop stages, methods of application, personal protective equipment (PPE), formulations, field margins and sprayer types can be found in Section 2.1.1. Wherever possible, controlled terminologies have been derived from the EFSA Standard Sample Descriptions.

The following is an account of the range of questions asked by each surveyor on farm, the issues in the collection of data and data entry onto the Capex2 database. Where appropriate, comments have been made on the effectiveness of these questions, the data collection and data entry. Recommendations have been made which would improve data collection for any future surveys.

2.1.3.2. Product database

Essential to any study where PPP usage data are collected is a database which links the products encountered in a survey to the active substances and their concentration within each product.

For the current survey, and also for the pilot study the product database consisted of three tables; active; active substance; and product. The active table contained each individual active substance linked to an EFSA Parameter code, an active substance name and Parameter type (PPP residues, Organic contaminant, Toxins etc.). The active substance table joined to both the active table and the product table storing the percentage and proportion of each active substance within a product, for example the UK product Aphox contains a single active substance – pirimicarb, which has a percentage of 50% active substance and a proportion of 1 (as it is the only active substance within the product). By contrast the UK product Dovetail, has two active substances, lambda-cyhalothrin and pirimicarb, which are present in the product at 0.5% and 10% respectively. The proportion of lambda-cyhalothrin in the product is therefore 0.05 whilst that of pirimicarb is 0.95.

Example SQL from the active table

select * **from** active **where name** = "pirimicarb";

id	code	name	parameter type
5176	RF-0347-002-PPP	Pirimicarb	Residue definition

Example SQL using active, active_substance & product tables

select product, product. ai, percentage, proportion

from product, active_substance, active

where product.id = active_substance.productnum

and active.id = active_substance.ai_id

and product **in** ("Aphox","Dovetail")

and product.country = "UK";

product	ai	percentage	proportion
Aphox	Pirimicarb	50	1
Dovetail	Lambda-Cyhalothrin/Pirimicarb	0.5	0.05
Dovetail	Lambda-Cyhalothrin/Pirimicarb	10	0.95

Example SQL using active_substance & product tables

select product,product.ai,ftype

from product, active_substance

where product.id = active_substance.productnum

and product **in** ("Aphox","Dovetail")

and product.country = "UK";

product	ai	formulation type (ftype)
Aphox	Pirimicarb	WG
Dovetail	Lambda-Cyhalothrin/Pirimicarb	EC
Dovetail	Lambda-Cyhalothrin/Pirimicarb	EC

Questions asked

In order to evaluate all other data collected during the survey it was essential that detailed product information was collected. In the vast majority of cases this was achieved as the surveyor worked through the farmers spray records or asked questions relating to the spraying. Seed treatment data were not available for all farms and in some cases molluscicide usage was unspecified. However, unknown data accounted for only 0.007% of all data collected.

Details on the products used; active substances and their percentages were sometimes available on farm but in most cases details on individual products were identified once back in the office. The collaborators in the project already had or had access to PPP databases and used these to supplement the data collected on farm.

Data entry & issues arising

Product information, once collected, had to be entered onto the Products section of the Capex 2 database. If a large number of products had been encountered this could take a long time to enter the data. Some attempts were made to load the information from spreadsheets onto the database but this was not always successful and it was considered "safer" to enter the data via the Capex 2 data entry screen. All product data were checked by the individual collaborators at the end of the project to ensure that the details had been entered correctly.

Recommendations for future surveys

Whilst the active substances were available via a drop down list and therefore reduced errors, other fields were more open and only had restrictions on characters in numeric fields and limits on the percentage and proportion fields.

Regular updates from the EFSA Parameter code list would also be beneficial.

Greater standardisation on the use of upper & lower case so that these match exactly commercial product names would increase the usability of the database. However, this recommendation was made after the pilot study but unfortunately many of the products encountered in the previous survey were also encountered in the current survey and updates to the original product names were not made.

The product table links to Form 3 (product.id = form3a.productnum) in order to allow operator and worker exposure to PPPs to be calculated. Across the EU the same product name is used for products registered in a range of countries. However, although the name is the same the formulation may differ. For any future survey it would be beneficial to ensure that it would be impossible for a product registered in one country to be used during the data entry of another. Although this was rare, a single Spanish product was used on a number of UK holdings, and the data were updated retrospectively.

Although it would require a significant cost and continuous investment the use of a database which validates the approval status of a product and the rate of application (maximum and minimum) would be beneficial. This would have been extremely useful for Capex2 as there were difficulties in removing or updating high rates of application. It is proposed that further checks are made to the existing database by each of the individual countries after the publication of this report.

2.1.3.3. Form 1 – Cropping details form

Description

Form 1 was used to provide background information for the farm. It included details on the location and size of the farm and provided a summary of all cropping on the farm. It allowed the surveyor to have an overview of the type of questions that would need to be asked as the interview progressed.

In contrast to the previous study all crops, rather than only the selected crops were included in the study if these had been sprayed by the principal spray operator.

Data from the paper Form 1 were stored in two tables within the database. The first table - **form1**, contained detailed information on the unique reference number allocated to the farm to ensure confidentiality; country; region within the country; farm size group; date of visit and the surveyors' initials. The second table, **crops**, contained additional data on the crops grown; the area of each crop grown; whether the crop was included as part of the sample and a list of the operators and workers encountered on the farm and an indication as to how they were associated with the sampled crops.

Questions asked

Farm Details

Each farm was allocated a unique reference number and farm size group prior to the visit. Information was collected on the country and region and these values linked to lookup tables which contained lists of countries (**country**, **region**) and regions from the EFSA database.

Farm size group is subject to change between the time of sample selection and the surveyors visit (the date of which was also recorded on Form 1). There is no way of avoiding this and it is almost impossible to compensate for when in the field – particularly if the population you are sampling is small. However, farms are normally re-sized when making national estimates of PPP usage and whilst some change does occur it is often reciprocal with other farms in the sample either moving up or down size groups.

Farm size increased significantly on some of the farms visited in the study.

A particularly important issue of this study which contrasted strongly with the pilot study was the additional workload put onto the field surveyors who had to collect data, not only from the sampled farm, but also any that were sprayed by the principal operator. This added a significant amount of time to the farm visits and in a number of cases several appointments had to be made to collect all of the data.

Crop details

The crops encountered on each farm, or group of farms sprayed by an operator, were recorded and on the data entry screen these linked to a lookup table which contained crop names and codes from the EFSA database (crop). Where a crop was encountered on farm but was not present within the EFSA list then the actual crop was recorded. Retrospective checking ensured that the actual crop data were standardised and that the crop name data were consistent with the EFSA name and code.

The collection of data for Form 1 was quite straightforward. However, calculating the total areas grown on a farm was sometimes difficult for a farmer or grower to establish. This was further complicated where a number of farms were managed by a single person.

Operator details

It was assumed that the principal spray operator could have worked on any of the crops grown on the farm. This may only have been a single application on each field or all applications to all fields depending on the number of other spray operators present on the farm.

Recommendations for future surveys

No major improvements are needed on this form.

As indicated above the inclusion of all activities of the principal spray operator did double the length of each visit from 1-2 hours in the pilot study to an average of 3-4 hours in the current study.

The sampling methodology may also need to be revised away from specific cropping groups and more towards different farm sizes (irrespective of the crops grown on them). This is particularly important for arable or rotational crops where the area of each crop may change annually.

The sample for any future studies has to be carefully selected to include only those holdings with comprehensive computer or paper based records or with a more limited range of crops. Bearing in mind the significant amount of extra time needed to collect the data from each holding, to process the data and to enter the data onto the database it is essential that any future work is more fully and accurately costed.

The time required for this study has meant that a number of countries have exceeded their original budget in order to deliver the quality of data required.

2.1.3.4. Form 2 – Farm business details form

Description

This again was a straightforward form which allowed the surveyor (and the farmer) to organise how the interview was going to be structured. It allowed the surveyor to establish whether more than one farm was managed by the farmer, the number of spray operators, spray decisions, the number of workers and the range of worker activities carried out on the farm. This allowed the surveyor to estimate the length of time the visit was likely to take and how the most accurate and pertinent data could be collected.

It differed significantly from the previous study in that additional questions on buffer strips and integrated pest management were included on this form.

Data from the paper form 2 were stored in a single database table, **form2**, within the database.

Questions asked

Multiple farms

In most cases, 86%, only a single farm was managed. However, where more than one farm was managed all data relating to the principal operator was collected.

Initially questions on multiple farms only asked for the total number of farms managed and the area of all farms. However, after a number of visits and as a result of the detailed information required for Form 3 it was decided to add a question which asked for the percentage of detailed data collected from the sampled farm.

Of the 416 farms visited, 274 (90%) provided data for 100% of the principal spray operators pesticide usage, 17 (4%) part of the data needed and 25 (6%) none of the pesticide usage. It may be that there was some misinterpretation of this question and it should have said what percentage of the principal spray operators activities have been collected and recorded.

Spray operators

Spray operator questions included how many spray operators (excluding spray contractors) do you have on the farm; what percentage of contractor spraying is there on the farm and what is the type of spray contractor (farmer, agricultural contractor, spray contractor or other).

Spray decisions

Farmers were also asked about their use of agronomists and professional advisors. This information was straightforward to collect and readily available.

Buffer strips and watercourses on the farm

This was new question which brought added information for the ERA analysis. Data on the presence of permanent and temporary watercourses, field buffer strips, in-crop buffer strips and wind breaks was collected without any problem.

Integrated pest management

Another new question looked at individual countries approaches to integrated pest management (IPM). A total of 388 (93%) of the 416 farms sampled said they practiced some form of IPM on farm. Specific examples of IPM included crop rotation; growing resistant varieties; use of monitoring traps; biological control; predictive models (for spray forecasting); increasing beneficial populations of predators, parasites and pollinators and optimising pesticide choice.

Recommendations for future surveys

The importance of the question relating to detailed records should be highlighted as it is a key factor for the future analysis of all data. It should have been more fully explained to all participants at the start of the project.

It is important for the data entry screen that the initial question (IPM on farm) is set to True (Yes, positive) if there are any positive entries in any of the subsequent questions on IPM. Many of the forms had to be updated at the end of the survey.

2.1.3.5. Form 3 – PPP application form

Description

This was the most critical form of the survey and included detailed records of the crops, the areas grown, the dates, rates and methods of application of all PPPs applied to an individual field. It also contained information on the operator, the sprayer, nozzles, start time of spraying and duration of spraying. In some cases not all of the information was available and a default value of 99 or UN was recorded to indicate where data were not available. The aim of the study was to collect all pesticide usage by an operator within a twelve month period including applications made to non-crop areas such as farm grain stores, gravel drives and the farm yard.

On each farm one or more fields were selected as environmental fields. From the environmental field additional information was collected on the field margins and, where available, historical pesticide usage data for the last five years were also collected. For this study historical data were only available from Greece, Lithuania and the United Kingdom.

The intention of the study was to collect data on the principal spray operator. In order to minimise the time taken for the collection and processing of the data and the time spent by the farmer or grower in providing the data only data relating to the principal spray operator activities were collected. The only

exception to this was on the Environmental Field where all pesticide applications made to the field were recorded.

The availability of data varied from country to country with the majority of data being available from paper records or custom built farm management software. However, there were occasions where information on some PPP usage was not regularly recorded and this data had to be obtained by using Forms 7 and 8 and a series of probing questions.

In all cases the farmer was informed of the level of detail required for the survey prior to the visit and was asked to make records of the PPP applications during the season and in order that data could be collected at the time of the visit. For those farmers and growers part of crop assurance schemes this information was already collected, recorded and was readily available for the study. Because of the legal requirements for record keeping throughout Europe data on the usage of PPP's is regularly recorded. However, the level of detail recorded can be variable and for some countries information on the length of time spent spraying was not available.

In some cases data relating to PPP applications were not available at the time of the interview and repeat visits, emails and telephone calls had to be made to collect all data.

Data from the paper Form 3 were stored in two tables, **form3** and **form3a**, within the database.

A total of 36,355 rows of PPP data were collected as part of the survey. This is double the number of rows collected in the previous pilot study which was based on single sampled farms rather than all of the farms that an operator may work on.

Questions asked – agronomic information

Field number

The field number linked to the holding number and together these provided a unique reference, not only of the fields on each individual farm, but also a unique record within the database. A separate field number was used for each field, orchard or group of crops.

For Environmental Fields the field number was duplicated for each year of historical data that was available. In order to distinguish one record from another an additional column (not present in the pilot study) was added which indicated the year of pesticide usage.

Field number was a two digit number although the database had to be modified to incorporate three digits for some of the larger farms where the number of fields exceeded 100.

Crops

The crop information collected matched the information on Form 1. However, whereas Form1 included totals of all the crops grown on the holding (sampled and not sampled) Form 3 presented data on individual fields, or groups of fields where these were treated identically. Where a crop encountered was not on the EFSA list it was recorded as "Not in list" and the actual crop name was recorded on the data entry screen.

Crop number

Where multiple cropping occurred on a single field the field number was again duplicated but the crop number distinguished one crop from another. There was some confusion over the use of this data

entry field, with some countries allocating a crop number to each crop grown adjacent to each other in a single field. However, the main intention of this data entry field was to record sequential cropping on the same area of land.

Area

All areas were recorded in hectares. Where information was provided in square metres or in acres (UK only) it was converted to hectares.

Single or multiple treatments

This is included to take into account the difference between treatments made to a single crop or group of crops treated identically and a group of crops treated very differently. A Single Treatment record allows those querying the database to extract the actual spray programme applied to a crop during the season. A Multiple Treatment record indicates that the treatments are variable and that different spray programmes have been used on grouped fields it still contains details on operator exposure.

All of the Environmental Fields were a single field with a single spray programme.

Inter-row/plant base applications

For row crops, such as apples, blackcurrants, strawberries or vines, some applications, particularly herbicides, are made either to the base of the crop or between the crop rows. When this occurs it is important to be able to express the area treated and the weight of PPP applied using calculations which take into account the actual area treated.

The percentage of inter-row to plant/tree base was recorded on farms where row crops where grown, the two percentages added up to 100. These percentages can then be expressed as a proportion and used in combination with IR, PB, TB methods of application in Form 3a (PPP details) to calculate actual areas sprayed and weights of active substance applied.

Questions asked – PPP information

This part of the form is vital in calculating operator exposure on a daily, monthly or annual basis. However, in order to avoid the duplication of data and thereby overestimate exposure it is essential that the database is fully checked before use.

Multiple products within a spray round or tank mix can double or triple (depending on the number of products within the mix) the hours worked or areas treated. Therefore when looking at areas treated or hours spent spraying by an operator it is essential to have access to a “unique” list for each day rather than sum all hours or areas treated within a tank mix. Any differences in the areas treated or hours spent spraying will make the daily record not “unique” and therefore overestimate usage.

Please refer to the section on error checking for more details.

Timing of applications

Data collection covered PPP applications over six years, 2013 (74% of the total), 2012, (12%), 2011 (6%), 2010 (5%), 2009 (3%) and 2008 (1%). The date information collected by surveyors was excellent with 97% of the 36,355 rows of PPP data having an actual date; a further 3% had a date which indicated early, middle or late of the month (see Instructions to Surveyors, Appendix A); less than one percent had an unspecified date.

Future improvements to the data entry screen would ensure that the year on the data entry screen would match the year recorded as an actual date.

Crop growth stage

Good information on the crop growth stage was collected in all cases.

Product

Good information was collected on the products used on each farm. It was not possible to add a product to form 3 if the product was not already on the product database. In future it would be best if the name of the product matched exactly the commercial name of the product including matching both upper and lower case. This was also a recommendation in the previous study.

There were some issues in transferring data between Capex and Capex2 and many of the active substances did not join correctly to the product name. This has been corrected for all of the data collected in the current study but some work needs to be done on a limited number of the products encountered in the previous study.

Methods of application

Good information on the method of application was collected. However, with some crops it was difficult to categorise some methods of application, particularly when different methods of delivery could be used with a single sprayer; for example a hydraulic sprayer (HD) and drench (DR) could all effectively be used from a single sprayer.

Similarly for vines, a single sprayer could be used as a hydraulic sprayer (HD) for herbicide applications or a broadcast air assisted sprayer (BA) for fungicide applications.

In arable crops a further complication arose when a molluscicide spreader was mounted on a hydraulic sprayer. Although these constitute two different sprayers with two methods of delivery the hours spent "spraying" with the two machines is the same – it is therefore important not to duplicate this number of hours spraying in subsequent calculations.

Seed treatments (ST) caused additional problems in that the time recorded on Form 3 was the time spent drilling rather than the time spent loading the seed into the seed drill. This information is recorded on Form 6.

Water volumes

Sprayer water volumes were present in approximately 79% of the rows of data recorded (excluding GB, DU, FO, GI, HM, HG, SM, ST, VC, MB, MI & SD methods of application).

Rates of application

In most cases, 99% of the rows of data (excluding seed treatments), an actual rate of application was collected. Using this information and the units data it was possible to update a new column which expressed all values in litres or kilograms of product/hectare. An improvement to the data entry screen would include a prescribed list of units as both upper and lower case values, or mixtures of the two were entered. An automatic update of the new_amt column would be beneficial in any future survey, rather than relying on its update using SQL.

Spray round

The spray round is a key item of data and provides a number which links each product within a tank mix. This information has been essential in calculating the areas sprayed and the number of hours worked by an operator on a farm. One difficulty in dealing with a two or three way tank mix is that the area treated or the number of hours worked can be doubled or tripled. Using the spray round number to identify a unique occurrence has allowed the calculation of the area treated and hours worked by an operator.

It is essential that all columns with the exception of the product name are identical within a spray round. Failure to ensure this will result in overestimation of operator exposure.

Operator, sprayer and nozzle numbers

These fields contained good consistent information. In the future it would be beneficial if these fields could highlight the type of sprayer or nozzle chosen. In a number of cases the sprayer number recorded has not been matched to the actual sprayer used. However, this is difficult as the PPP data are normally entered before the operator and sprayer information.

Initially all three fields were required fields and obviously operator number is always required. However, as seed treatment data are also entered on this form the sprayer numbers and nozzle numbers are irrelevant. In other cases the nozzle number is also irrelevant, for example molluscicide applications.

All three numbers (or lack of numbers in the case of seed treatment (ST) or dust (DU) applications) should be consistent within a spray round.

Operator hours

The quality of this information was much more variable than for other data already discussed; with 70% having the hours spent spraying recorded and 48% having a start time. Where the number of hours spent spraying was not available this was recorded as 99 and if the start time was not available "UN" was recorded. In some cases where the actual start time was unknown AM (14%) or PM (1%) was recorded

When using data from the database it is suggested that information associated with actual dates is the most robust as these data have a true number of hours worked. For rows of data with no dates or with the date expressed as part of a month (E, M, L etc.) these can either include daily hours or the cumulative time taken to complete a task. This is particularly relevant where fields have been grouped and the time taken to spray the group of fields may be extended over several days.

However, using the operator number (all principal operators are 01) and survey year 2013 an operators annual exposure can be calculated.

It is also essential that any manipulation of the data only includes survey year 2013. It would be very easy to overestimate operator exposure by including historical data.

2.1.3.6. Form 4 – Spray Operators

Description

This form was used to collate information on the principal spray operator on the farm. In some cases details for other spray operators was collected. It included personal details on the operators and their behaviours relating to mixing & loading, cleaning the sprayer and use of PPE's.

Data from the paper form 4 were stored in three database tables, **form4** (operators personal details), **form4a** (mixing & loading, cleaning the sprayer) and **form4b** (use of PPE).

Data were collected relating to 438 operators. Each operator was allocated a unique code which was linked to the farm reference number. All principal spray operators have been recorded as spray operator 01 on each farm.

Questions asked

Spray operator details

Questions were asked relating to their age, gender and years of spraying experience. Further questions on their relationship to the holding (Owner/family member, Employee – National, Employee – Migrant, Contractor) were also asked. Where the age of the spray operator was unknown a default value of 99 was recorded.

Key questions included their spraying percentage on the farm, which was obviously 100% if they were the only spray operator and a contractor was not used and whether they were spraying on other farms. In contrast to the previous study all pesticide data relating to the principal spray operator was recorded.

Additional questions were asked relating to training and years of experience. Where their years of experience were unknown a default value of 99 was recorded. Operators were asked if they had received any training and if so when was the most recent year of training. Further information was collected on the type of training (theoretical, practical or both). Of the 438 operators sampled 77% indicated that they had a nationally recognised spraying certificate. This figure is 9% higher than in the previous survey reflecting the fact that most of the operators recorded were principal operators with spraying certificates.

Mixing, loading & cleaning the sprayer

Detailed information was collected from each operator on the average time taken to mix and load PPPs into each sprayer that they would use on the farm. The length of time to mix and load was expressed in hours and the average number of mixing & loading operations in a typical spraying day was also recorded. This information is extremely useful as it can be used in combination with their spraying activities on Form 3 and where available worker activities on Form 6. Where the mixing and loading time and frequency was not available a default value of 99 was recorded.

Further information on cleaning the sprayer was also obtained, indicating the time spent cleaning the sprayer and the average number of times it would be cleaned by that operator during the year. Where this information was not available 99 was used as a default value for the length of time spent cleaning the sprayer and the number of cleaning operations during the year. Where a sprayer was not cleaned a 0 was recorded for both questions. If a number of operators were present on the farm this information could be repeated several times – it is important that the number of cleaning operations is not duplicated.

Personal Protective Equipment

The use of PPE was split into four separate operation types: Mixing & loading (ML), Cleaning the sprayer (CL), Application (AP) Worker activities (WA). Mixing & loading was broken down into a further two categories: ML – Mixing liquids and MS – Mixing solids. Information was collected on the PPE worn during each type of operation and the length of time (in days) between use and washing or disposal of the PPE. Where an item of PPE was not washed a 0 was recorded or if the number of days between use and washing/disposal was unknown then a default value of 99 was recorded.

Recommendations for future surveys

It would be useful to ensure that the principal spray operator was consistently labelled as 01 from the start of data entry. Some records had to be retrospectively updated in order to ensure that this was so.

2.1.3.7. Form 5 – Spraying equipment

Description

This form was used to collate information on all of the sprayers, primarily farm owned, used on the farm. It included information on the manufacturers name (where applicable), sprayer details including sprayer speeds, boom sizes and tank capacities, the sprayer type, PPP filling systems and the nozzle type and use.

In some cases data relating to sprayers were not available at the time of the interview.

Data from the paper form 5 were stored in two database tables, **form5** (sprayer details) and **form5a** (nozzle details).

Data were collected relating to 645 sprayers. Each sprayer was allocated a unique code which was linked to the farm reference number.

Questions asked

Sprayer equipment details

Where available the manufacturers name and model was recorded. For home-made sprayers, normally a tank, a pump and a boom, it was simply recorded as home-made. The ownership of the sprayer was recorded as either farm owned (FM), contractor owned (CO) or part of a machinery ring (MR). The farmer was asked whether the sprayer was tested as part of a sprayer testing scheme. Approximately 63% of the sprayers were tested as part of a sprayer testing scheme.

Sprayer details

The key question within this section asked the farmer to estimate the proportion of spraying conducted on the farm by each sprayer and the number of farms on which the sprayer was used. However, this question became more difficult if more than one sprayer was used on a farm or if a molluscicide applicator was mounted on the sprayer. For farms with only a single sprayer this was not an issue. However, the estimates made by farmers at the time of the visit were generally very good and the actual percentage was easily calculated once the PPP data had been entered onto the database (**Form 3**) expressing the percentage in terms of the area treated by each sprayer.

Information was collected on the typical spraying speed and this in combination with the boom size (which was also collected) allows the user to compare actual work rates per hectare (Form 3) with a theoretical work rate (using km/hr * boom size it is possible to calculate and estimated work rate).

These data can also be fine-tuned using the information collected on tank sizes (this form) and water delivery rates per hectare (Form 3).

Information was also collected on boom height although the data on the measured height above the crop was only available for 4% of the sprayers. Where the boom height was not available a default value of 99 was recorded.

Data on the age of the sprayer were collected on the majority of sprayers. However, for 52 sprayers (8%), the age was unknown and a default value of 99 was recorded.

Sprayer type

Information on the sprayer type was collected using the same codes used for the method of application in Form 3. This enabled a join to be made between the two tables linking the sprayer to both the PPP application and the operator.

The same issues, that of sprayers having multiple delivery mechanisms, described for the method of application in Form 3 also apply here.

PPP filling system

Information was collected on the types of filling system used on each sprayer. However, an additional question, direct fill (as opposed to direct pour) would benefit future surveys as this would capture information on granular, molluscicide and dust applicators. In many cases for these sprayers the information on filling methods used was either left blank or a comment was recorded within the PPP filling system – other category.

Nozzle type and use

Information was collected on 938 different nozzles with a number of different types of nozzle being recorded. Of these Flat Fan nozzles accounted for 36%, Air Inclusion nozzles 19% and Hollow Cone nozzles 17%. Unfortunately a number of the nozzles were recorded as Tee Jet, which is a manufacturer rather than a type of nozzle and these made up 15% of the total. Other unknown nozzles (UN) made up a further 7% of the total.

The quality of information on the nozzle name was variable with over 14% being unknown.

Where the pressure (bar) was unknown (9% of the total) a default value of 99 was recorded. The quality of data on pressure needs to be harmonised as some of the pressures in bar appear to be too high and it is likely that they have been expressed in the units used in other countries.

Information relating to the nozzle replacement frequency was available for 81% of nozzles; a default value of 99 recorded where this information was not available.

Not all sprayers used nozzles for example dust applicators (DU) and molluscicide spreaders (MB).

Recommendations for future surveys

Collection of data on boom height was not relevant for some sprayers and the quality of data for other sprayers was poor with only an estimated height being given. There are some questions over the value in collecting this data, further analysis may be beneficial.

Information on the percentage usage of a specific sprayer on the farm is probably unnecessary as these data are already readily available by querying the data stored in Form 3.

It is critical that the sprayer number in Form 5 matches both the sprayer number and method of application in Form 3. Several checks had to be made on the data to ensure consistency between the type of sprayer in Form 5 and Method of Application in Form 3. For calculation of operator exposure related to type of sprayer it is essential that both Form 3 and Form 5 agree.

Nozzle data for future surveys could be improved. The use of Tee Jet as a category has already been mentioned as unnecessary as it is a manufacturer and not a nozzle type. Data on the Local Environment Risk Assessment for Pesticides (LERAP) or drift status of other nozzle types would be a useful additional question.

2.1.3.8. Form 6 – Principal spray operator – worker activities

Description
This form was used to collate information on the work conducted by the principal spray operator on the farm. In particular the data were required to add to the non-dietary exposure data already collected in Form 3. As the format of the questionnaire had already been trialled during the pilot study the main problems and issues arising had already been dealt with.

The approach made to collect data on farm workers was initially the same as for Form 3 where a worker activity replaced a PPP and spray records were replaced by an operator/worker diary. The quality and the consistency of data collected varied. In the majority of cases there were no written records of operator/worker activities and in some cases there was no information available at all.

However, because of the amount of time taken in the collection of PPP data EFSA agreed that the operator/worker information was not a priority and for some farms operator/worker information was not collected.

Because of this operator/worker data were only available from 334 of the 416 farms sampled (80%).

Whilst date related data were not always available, information relating to specific activities, their duration, seasonality and clothes worn was available from many holdings.

Data from the paper Form 6 were stored in three database tables, **form6** (worker personal details), **form6a** (worker activity details) and **form6b** (average daily and weekly hours).

Data were collected relating to 339 workers with 6,624 activity related rows. Each worker was allocated a unique code which was linked to the farm reference number.

Questions asked – Worker details and hours

Worker details

Information on the worker had already been asked as part of Form 4 Spray Operator details, as such no further questions were asked. This is in contrast to the pilot study where additional information was collected on the workers (rather than spray operators on the farm).

Operator Hours

There was limited information collected on operators work related hours with information only being collected from 194 operators. However, the information contained within this table is extremely

detailed and there are almost 2,000 rows of data relating to an operators working week. In particular, the data show the average daily and weekly hours over a twelve month period.

Interestingly the figures show a 7 hour day and a 37 hour week, although this varies from country to country, operator to operator and crop to crop.

Questions asked - Worker activities

Timing of applications

Data collection covered worker activities over four years, 2012 (7% of the total), 2013, (93%) and 2014 (<1%). The date information collected by surveyors was excellent with 69% of the 6,624 rows of operator/worker activity data having an actual date; a further 29% had a date which indicated early, middle or late of the month (see Instructions to Surveyors) the remaining two percent had an unspecified date.

Future improvements to the data entry screen would ensure that the **yr** on the data entry screen would match the year recorded as an actual date.

Field Number

In order to ensure that a worker activity could be linked to PPP applications a record was made of the field number in which the worker activities had been conducted. This question worked well on the forms and the database.

However, for some tasks it was impossible to allocate a specific operator/worker activity to an individual field. In these cases the field number was recorded as 00 and the crop name was entered onto the database. For example, examination of insect monitoring traps can occur throughout the summer and in one day an operator/worker can be involved in examining traps in several different orchards.

Crop growth stage

Good information on the crop growth stage was collected in all cases as only data from a prescribed list could be recorded.

Re-entry times

This was a record of the number of days after a spray application that an operator/worker re-entered the field. A re-entry time was recorded for 29% of the number of operator/worker activity rows, with the remainder being recorded to the default value of 99. However, where a date of worker activity is available this can be linked to Form 3 and compared to the dates of PPP application. A re-entry time, in days could then be calculated by subtracting the worker activity date from the previous PPP application date. This would also be a good check for all other re-entry times as often these were estimated by the operator/worker at the time of the interview.

If dates for both operator/worker activities and PPP applications were always available a re-entry time would be irrelevant as it could be calculated retrospectively. However, where one or both is not available an estimated re-entry time is the most useful indicator.

The operator/worker was also asked how soon they would re-enter a crop after a PPP application had been made. This was a question that many could answer easily and some also had a policy in place on

the farm, possibly as part of their crop assurance scheme, which prevented them entering the crop within a specified number of days. For some, this was also refined according to the type of PPP applied, with a different value for fungicides, insecticides etc. However, on average 45% of those giving a response to the earliest return date question (irrespective of pesticide type) said they would wait at least a day before they re-entered the crop.

Activity codes

Good information on the activity codes was collected in all cases as only data from a prescribed list could be recorded.

Use of personal protective equipment

The information recorded on personal protective equipment and work wear used for each activity was generally good.

The data entry screen had changed significantly since the previous study and operator/worker PPE and clothing was recorded in Form 4 under each of the worker activity codes. Therefore good information on the PPE codes was collected in all cases as only data from a prescribed list could be recorded.

Worker hours

The quality of this information was variable with a time being recorded for 47% of the worker activity rows. This figure is lower than in the pilot study although this is likely to be related more to a change in project priorities part way through the study (see section 2.1.5). Where the number of hours worked was not available this was recorded as 99.

When using data from the database it is suggested that information associated with actual dates is the most robust as these data have a true number of hours worked. For rows of data with no dates or with the date expressed as part of a month (E, M, L etc.) these can either include daily hours or the cumulative time taken to complete a task. This is particularly relevant where fields have been grouped and the time taken to conduct an activity may be extended over several days.

Recommendations for future surveys

Other necessary changes to the data entry screen if more detailed operator/worker data is to be collected include the following:

- Ability to query and move to specific operator/workers – rather than by querying all and using ‘next’ to move through the database;
- Ability to copy data from an existing field to a new field; and
- Ability to delete rows.

The schema for the study was developed once the database had been finalised and is provided as Appendix H (database_schema–30_11_2014.xls).

2.1.3.9. Form 7 – Non-crop activities

Description

Form 7 data was used, but not recorded on the database; it was used to identify other areas of PPP usage not normally recorded within farm management software or conventional spray records. The form was used as an 'aide memoire' and a prompt for both the surveyors and for the farmers taking part in the survey. The main aim was to capture all other pesticide applications that had not been recorded on a conventional system and then transfer this data onto Form 3 for entry onto the database.

A number of PPP uses were identified that were outside the normal recording system including: insecticide applications to grain stores; herbicide applications to the farm yard, grassland (normally knapsack applications that can be easily overlooked), barren strips or skylark plots; pesticide applications made in the garden; herbicides applied to destroy crops that may harbour pests or disease, for example waste from potato grade outs; household or amenity pesticides and rodenticides.

This form proved extremely useful and additional PPP applications not recorded elsewhere were collected.

2.1.3.10. Form 8 – Worker activities

Description

As with Form7, Form 8 was used, but not recorded on the database; however, it was used to identify operator/worker activities around the farm. The form was used as an 'aide memoire' and a prompt for both the surveyors and for the farmers taking part in the survey. The main aim was to capture all work related activities and then transfer this data onto Form 6 for entry onto the database.

The design of Form 8 was tailored to the type of farm or survey being conducted. In the UK two forms were designed one for arable crops, the other for apples. Other countries used their own versions of the forms or added additional questions that were more relevant for the crops they were growing.

The form proved extremely useful. For arable crops information was collected on earliest return dates; crop inspections; crop rogueing; drilling; fertiliser spreading; harvesting; cultivations and other tractor driving. For fruit crops data were again collected on the earliest return dates and crop inspections, but also on insect trap monitoring; thinning; pruning; and picking. It was considered that the most important activities were those that took the operator/worker back into a crop and therefore at later visits anything relating to tractor driving was removed from the list.

2.1.4. Ensuring a representative data collection

2.1.4.1. Crop selection

The consortium consisted of institutes from a range of EU MS giving a reasonable coverage of the principal EU climatic regions and cropping types, including representative MS from Northern, Central and Southern zones. Available information was used to ensure, as far as was reasonably possible, that the study included a representative sample of the current agronomic and pesticide application practices which would be suitable for informing risk assessments for the cumulative non-dietary exposure and environment. To achieve this, expertise of the consortium and data from EUROSTAT were used to ensure that major crop types and agronomic practices for the EU area were included, together with some of the possible worst case scenarios for operator exposure. The EUROSTAT database was also considered as a source of land use data, together with the report of Agriculture in the EU Statistical and Economic Information, published in 2010, containing information on land uses for agricultural and horticultural crops. However these data are also incomplete, for example there are no data for the area of olives or cotton grown in Greece, see Table 2 below.

Table 2: Cropped areas in countries where the surveys were performed (1,000 ha)

	BE	**ES**	**GR**	**IT**	**LT**	**NL**	**PL**	**UK**
UAA total	1374	25657	3984	13338	2672	1933	15608	15263
Cereal (total excl. rice)	-	6645	1105	3814	1022	243	8599	3274
Sugar beet	-	52	14	62	0	72	188	120
Oilseeds (total)	-	935	15	235	-	6	791	614
Olives	0	-	-	1159	-	-	-	-
Cotton	-	53	-	-	-	-	-	-
Tobacco	-	10	16	-	-	-	17	-
Hops	0	1	0	-	-	-	2	-
Potatoes	-	82	34	71	48	152	530	144
Dry pulses	-	209	21	78	37	2	115	148
Fresh vegetables (total)	51	338	113	-	14	87	198	-
of which: - tomatoes	1	55	25	116	0	2	11	-
of which: - onions	1	21	7	13	2	26	26	-
Fresh fruit (total) excl. citrus	19	-	-	701	28	21	409	-
of which: - apples	8	-	12	59	10	9	172	-
of which: - pears	8	-	4	41	0	8	10	-
of which: - peaches	-	50	37	60	-	0	3	-
of which: - apricots	-	89	5	19	-	-	2	-
of which: - melons	-	36	7	28	-	0	0	-
Citrus fruit (total)	-	-	55	172	-	-	-	-
of which: - oranges	-	-	40	102	-	-	-	-
of which: - lemons	-	-	6	30	-	-	-	-
Vines	-	-	87	788	-	0	0	-
Flowers and ornamental plants	1	3	1	4	0	28	2	6
Green fodder	182	351	2	896	80	243	442	180

(a): '-' information not available

(b): Table taken from: Agriculture in the European Union statistical and economic information 2010. European Commission Directorate-General for Agriculture and Rural Development. http://ec.europa.eu/agriculture. ISBN 978-92-79-19302-6

Based on the existing and published data for cropping in each of the eight MS carrying out the surveys, and to give a good range of crops in the project as a whole, the crop types shown in Table 3 were agreed. Each crop type is included in a country where that particular crop is important

nationally, and they cover a range of pesticide application techniques and worker activities. Each crop type was covered by a minimum of two MS and upto five MS for vegetables.

Table 3: Crop types selected for the survey

	BE	ES	GR	IT	LT	NL	PL	UK	Crop totals
Wheat					X		X	X	3
Potatoes	X				X	X			3
Oilseed rape					X			X	2
Maize	X			X			X		3
Sugar beet	X							X	2
Apples				X			X	X	3
Citrus		X	X						2
Grapes		X	X	X					3
Vegetables		X	X	X		X	X		5
TOTAL	3	3	3	4	3	2	4	4	26

(a): X = crop type surveyed by that country

2.1.4.2. Farm selection

Each of the institutes followed the Guidelines for the collection of statistics on the usage of plant protection products within agriculture & horticulture (Thomas, 2000). The same guidelines had been followed in the 2011 pilot survey; for those countries who had participated in both surveys the methodology was repeated.

Belgium

In Belgium, the crops potatoes, sugar beet and maize were sampled. These crops could have been present on a single sampled farm. Whilst 20 of each crop were required the fact that multiple crops were present on a single farm meant that 37 farms were sampled in total. Of those 37 farms, 31 cultivated potatoes and maize while 25 farms cultivated sugar beet.

For each of these crop groups, sub-groups were made based on the crop areas in Flanders provided by Statistics Belgium (DGSEI). Similarly for other countries the surveys were focused on particular regions, rather than attempting to obtain a nationally representative survey sample. Table 4 shows the distribution and size groupings of the sampled farms. From the UK experience the behaviour of operators and workers varies significantly between smaller and larger farms. It was therefore important to include a range of farm sizes in order to ensure that the survey was representative of these behaviours.

The basic principle of the sampling frame is to have five size groups, each with approximately 20% of the area grown (commodity group or selected crops) within them – not 20% of the number of farms in each size group. This normally results in much smaller numbers of farms in the upper size groups but

large numbers of farms in the smaller size groups. For Belgium, only four size groups could be made for the crops potatoes and sugar beet and three groups for maize. Five size groups were not possible since then the stated 20% of the area grown could not be reached.

The data collected from the farms sampled as part of the EFSA survey will not be representative of all farms across the sampled regions, and the data could not be used to make either regional or national estimates of pesticide usage. The aim of the current survey was to collect data in order to improve models of operator and worker cumulative exposure; it was not intended to produce national estimates of pesticide usage.

Table 4: Farm size classes for potato, sugar beet and maize farms in Belgium

Farm areas	**A**	**B**	**C**	**D**	**Total**
Potato size classes (ha)	< 5	5 - 10	10 - 20	> 20	
Potato area (ha)	9,884	12,117	10,678	13,970	46,659
Number of farms	4,734	1,764	803	328	7,629
Sugar beet size classes (ha)	< 5	5 - 10	10 - 20	> 20	
Sugar beet area (ha)	6,282	8,404	7,551	6,120	28,357
Number of farms	2,071	1,211	553	169	4,004
Maize size classes (ha)	< 10	10 - 20	> 20		
Maize (ha)	39,613	42,612	67,035		149,261
Number of farms	9,381	3,039	1,960		14,380

(a): The sugar beet data is based on the commodity group 'Industrial crops'
(b): The maize data is based on the commodity group 'Cereal grains'

Greece

The farm selection process in Greece was performed according to the "Guidelines for the collection of statistics on the usage of plant protection products within agriculture & horticulture" (Thomas, 2000). The same guidelines had previously been considered in the 2011 pilot survey. In Greece, crops were chosen on the basis of being representative of major cropping areas, and also allowing for comparison between crops characterised by intensive use of plant protection product (grapes and plum tomato) with less intensively managed crops (citrus).

The regions originally selected for the survey were Attica, Peloponnese and Crete. The selection was made considering that in these areas at least two out of the three crops (citrus, grapes or vegetables) are important, and thus were considered representative for the purposes of this survey.

Frequency distributions for individual crops/commodity groups in each area were obtained from OPEKEPE (Payment and Control Agency for Guidance and Guarantee Community Aid) which is the Official Agricultural Department in Greece. Following the provisions and evaluation of the above information and considering the project requirements as well as the need for close collaboration with farmers, the areas of Peloponnese and Thessaly were finally selected.

The individual farm selection was performed on site following a consultation with the local agronomists for the proper setup of the initial contact with the farmers in order to both identify farms for which the required information (including operator diaries) were available and also to contact farmers who would be willing to provide details for other crop activities.

Not all sampled crops were present on a single sampled farm. Whilst 20 farms were required for each crop, finally 68 farms were sampled in total (26 vegetables, 26 grapes & 20 citrus).

In Greece, the data collected from the farms sampled as part of the EFSA survey may not be representative of all farms in the sampled regions or across the country. However, this factor should not limit the significance of the data collected, since the aim of the current survey was to collect data in order to improve models of operator and worker cumulative exposure and not to produce national estimates of pesticide usage.

The survey size groups identified for each crop/commodity group were based on field data from OPEKEPE, these and the field size distribution for the sampled crops in Greece and the regions of concern are presented in Table 5 for grapes, citrus and vegetables. Considering that the data obtained from OPEKEPE for the crop/commodity groups were on a field basis the sampled farms were categorized in groups taking into account the mean field size in each farm.

Table 5: Farm size classes for grape (Hleia and Larissa region), citrus (Argolida and Hleia regions) and vegetables (Hleia and Achaia regions) farms in Greece

Farm areas [a]	**A**	**B**	**C**	**D**	**E**	**Total**
Grape size classes (ha)	< 0.45	0.45 – 0.84	0.84 – 1.315	1.32 – 1.69	> 1.74	
Grape area (ha)	4,531	4,528	4,605	4,541	4,667	22,872
Number of fields	20,553	7,923	4,346	2,995	2,007	37,824
Sampled farms [b]	3	13	7	2	1	26
Citrus size classes (ha)	< 1.15	1.153 – 1.24	1.247 – 1.4	1.41 – 1.865	> 1.866	
Citrus area (ha)	2,775	2,798	2,670	2,909	2,851	14,003
Number of fields	3,637	2,307	2,045	1,904	1,460	11,353
Sampled farms [b]	14	2	1	2	1	20
Vegetable size classes (ha)	< 2.4	2.41 – 2.99	3.0 – 3.61	3.69 – 4.46	> 4.5	
Vegetable area (ha)	2,034	2,098	1,970	2,079	2,514	14,827
Number of fields	934	102	123	51	62	1,272
Sampled farms [b, c]	16	3	3	1	3	26

(a): The size groups for Greece have been calculated at a field basis considering the available statistics
(b): Based on mean field size for each sampled farm
(c): Plum tomato and pumpkin

Italy

Following the project requirement, the survey in Italy was performed involving 81 farms divided equally between 4 different crops: maize, wine grapes, apples and vegetables (tomatoes grown for processing). In order to be statistically representative the sample was defined from five size farm classes for each crop (Table 6) according to the total surface area covered in Italy taking into account official national data available from ISTAT (Institute of National Statistics) and following the principles of the guidelines provided (Thomas, 2000).

Table 6: Farm size classes for maize (Lombardia and Emilia Romagna regions), wine grapes (Emilia Romagna and Veneto regions), apples (Piemonte region and Trentino regions) and vegetables (tomatoes grown for processing) (Parma, Piacenza, Cremona and Mantova provinces) farms in Italy

Farm areas	**A**	**B**	**C**	**D**	**E**	**Total**
Maize size classes (ha)	0 – 9.99	10 – 19.99	20 – 49.99	50 – 99.99	> 100	
Number of farms	4	4	4	5	4	21
Wine grapes size classes (ha)	0 – 2.99	3 – 9.99	10 – 19.99	20 - 49.99	> 50	
Number of farms	4	6	4	3	3	20
Apples size classes (ha)	0 – 2.99	3 - 4.99	5 – 9.99	10 – 19.99	> 20	
Number of farms	4	3	6	3	4	20
Tomatoes size classes (ha)	0 – 19.99	20 – 29.99	30 – 49.99	50 – 99.99	> 100	
Number of farms	4	3	5	5	3	20

Lithuania

Farms were grouped by size (Table 7). 31 farm were sampled to represent potatoes, wheat and oilseed rape, 20 or more farms for each crop, the majority of farms grow multiple crops. When sampling farms, the all five historical-ethnical regions having different soil types and landscapes were covered.

Table 7: Farm size classes Lithuania

Farm areas	**A**	**B**	**C**	**D**	**E**	**Total**
Farm size (ha)	< 10	10 – 30	30 - 100	100 - 400	> 400	
% of total area	21	17	20	21	21	
Number of farms:						
Oilseed rape	1	1	6	10	3	21
Potatoes	2	4	10	5	3	24
Wheat	1	4	11	9	3	28

Netherlands

Within the Netherlands potatoes and vegetable crops were chosen for the survey. For each crop 20 surveys were required. Since a lot of farmers both had potato and vegetable crops grown on the farm the surveys have been combined. This means that at the beginning of the project 30 farms were surveyed of which 21 farms had potato and vegetable crops and 9 had only vegetables.

Farms in the North region of the Netherlands (Flevoland) and the South region of the Netherlands (Noord Brabant) were recruited for participation in the survey. These regions were selected as the major growing areas for these two crop groups, so represent a cross section of farm sizes for these regions only. The data collected from the farms sampled as part of the EFSA survey will not be representative of all farms across the sampled regions, and the data could not be used to make either regional or national estimates of pesticide usage. The aim of the current survey was to collect data in order to improve models of operator and worker cumulative exposure; it was not intended to produce national estimates of pesticide usage.

Poland

In Poland the database of Plant Health and Seed Inspection was used in the selection of farms, which provided the addresses of farms in each size group (Table 8). In the first stage the initial letters were sent to farmers to obtain permission to conduct research. However, the response was poor (as experienced during the pilot survey). In the second stage, with the help of the Inspection, farms were selected and contacted by phone. The basic principle of the sampling frame was to have five size groups, each with approximately 20% of the area grown in all crops. One of the criteria for farm selection was possibility of making surveys simultaneously on both wheat and maize on one farm.

Table 8: Farm size classes for wheat (Slaskie, Opolskie, Dolnośląskie provinces), apples (Lodzkie province), maize (Slaskie and Opolskie provinces) and vegetables (Slaskie and Opolskie provinces) farms in Poland

Farm areas	A	B	C	D	E
Wheat size classes (ha)	< 5	5 - 15	15 - 50	50 - 200	> 200
Apples size classes (ha)	< 2	2 - 4	4 - 6	6 - 10	> 10
Maize size classes (ha)	< 5	5 - 15	15 - 50	50 - 200	> 200
Vegetable size classes (ha)	< 0.5	0.5 - 1	1 - 2	2 - 5	> 5

Farms have been selected according to the statistics of the Ministerio de Agricultura, Alimentacion y Medioambiente, concerning citrus, vegetables and vineyards for wine production. The region selected has been the East of Spain, Valencia region, which has the highest number of farmers growing the target crops. They are therefore representative of the major cropping areas in Spain. The size distribution for individual farm selection has been chosen using the information supplied by "Cooperatives agroalimentaries de Valencia", which includes data from the entire region. Most of the farmers contacted have been very cooperative being willing to provide details for their crop activities; most of them have field books containing information about the agricultural practices.

A total of 60 farms were selected for sampling, corresponding to 20 of each crop. All representative crops were included. Citrus, either oranges as mandarins were selected as they each account for more than 45% of citrus

crops, and together they covered more than a 90% of citrus crops; the range of vegetables sampled was also representative of these crops and vineyards for wine production were selected over a range of different agro-climatic conditions in Valencia, from the coast to the interior, to sample most of agricultural practices in this crop. Some farms had additional fields, which were sampled to obtain the total information relating to individual operators.

Table 9: Farm size classes for vineyards for wine production, citrus and vegetables in Spain

Farm areas	A	B	C	D	E	Total
Vineyard size classes (ha)	< 1.00	1.01-2.60	2.61-3.60	3.61-4.00	> 4.01	
Sampled farms	4	4	4	4	4	20
Citrus size classes (ha)	< 0.24	0.25-0.50	0.51-1.70	1.71-2.20	> 2.20	
Sampled farms	4	4	4	4	4	20
Vegetable size classes (ha)	< 0.5	0.51-1.40	1.41-2.34	2.35-2.75	> 2.76	
Sampled farms	4	4	4	4	4	20

United Kingdom

Within the UK crops were chosen to be both representative of major cropping areas and to compare broad acre field crops with more intensively managed horticultural crops. Arable crops were chosen as they account for over 90% of the total treated area and weight of pesticides applied to crops in the United Kingdom. Orchard crops, including apples, pears, plums and cherries, being grown more intensively and using a range of different growing practices provided a useful contrast.

Sampled arable crops for the UK, included wheat, oilseed rape, sugar beet, could have been present on a single sampled farm. Whilst 20 of each crop were required the fact that multiple crops were present on a single farm meant that only 45 farms were sampled in total. Apples were present on each sampled farm and a total of 20 farms were visited.

The original samples for these pesticide usage surveys had been derived from the June Agricultural Survey conducted by the Department for Environment Food & Rural Affairs (Defra). An initial frequency distribution of farms, stratified by Government Office Region and farm size (based on the area of sampled crops grown on each farm) was obtained from Defra. For the arable survey there were six size groups, each containing 15-20% of the total area grown nationally. For the orchard survey there were five size groups, each with approximately 20% of the total area grown in each.

For the purposes of this study these farms were further sub-sampled to include only the most intensive arable and orchard regions of the UK. Similarly for other countries the surveys were focused on particular regions, rather than attempting to obtain a nationally representative survey sample. From the UK experience the behaviour of operators and workers varies significantly between smaller and larger farms. It was therefore important to include a range of farm sizes in order to ensure that the survey was representative of these behaviours.

The basic principle of the sampling frame is to have five size groups, each with approximately 20% of the area grown (commodity group or selected crops) within them – not 20% of the number of farms in each size group. This normally results in much smaller numbers of farms in the upper size groups but large numbers of farms in the smaller size groups. For example, in England 12% of the area of arable crops is in the smallest size group (< 50 ha) but this has 52% of the total number of farms. For the

UK, an extra category of Group F has been added to recent national surveys to take into account some of the large farms which exist now in the UK, particularly in England, and it can be seen (from Table 10) that there has been significant movement in the distribution of arable areas since the national size groups were first set up.

For the UK, farms were selected in the Eastern region for arable, and in the South Eastern regions for orchards. These regions were selected as the major growing areas for these two crop groups, so represent a cross section of farm sizes for these regions only.

Within the UK, there are four separate countries and a total of 11 separate regions, of which the Eastern region accounted for 23% of all arable crops grown and South Eastern region comprised 38% of the total area of orchard crops grown. For the national survey of pesticide usage on arable crops there is a greater percentage, 47%, of sampled holdings in the upper size groups (over 250 hectares) in Eastern region, than in South Western region where only 29% of the total number of farms sampled in this region came from the larger size groups. The situation is similar for orchard crops where 53% of the total number of holdings sampled in the South Eastern region came from the larger size groups (> 30 ha) compared with 17% in the South West.

In the UK an arable sample of 600 holdings for England & Wales (with 152 holdings in Eastern region) results in standard errors of less than 5%. However, for the EFSA survey, a total of less than 50 holdings were sampled in Eastern region. For orchards, the UK sample of 314 holdings (with a total of 109 holdings in South Eastern region) also resulted in standard errors of less than 5%. A total of 20 holdings were sampled in the South Eastern region for the EFSA survey.

The data collected from the farms sampled as part of the EFSA survey will not be representative of all farms across the sampled regions, and the data could not be used to make either regional or national estimates of pesticide usage. The aim of the current survey was to collect data in order to improve models of operator and worker cumulative exposure; it was not intended to produce national estimates of pesticide usage. An example of the comparison between the current EFSA survey sample numbers and a national survey is shown in Table 10.

However, whilst the original sample was based on the area of arable or orchard crops grown on a farm, the overall area of crops included in the sample increased if a spray operator was spraying on more than one farm (Table 10). This is in direct contrast to the previous pilot study where the data collected related to the sampled farm only and not to any other farms that an operator may be working on.

It can be seen from both Table 10 that there has been movement across size groups between sample selection and survey visit. The trend is generally to larger size groups reflecting the increased number of farms managed.

Table 10: Farm size classes for arable and orchard farms in England (2013 data)

Farm areas	A	B	C	D	E	F	Total
Arable size classes (ha)	<50	50-100	100-150	150-250	250-500	>500	
Arable area (ha)	421,688	548,142	494,154	716,207	819,784	579,665	3,579,639
Number of farms	19,810	7,606	4,028	3,732	2,417	779	38,372
Eastern region national sample (number of farms)	9	19	21	33	41	30	152
Originally selected EFSA sample (number of farms)	2	3	4	7	6	3	25
Actual EFSA sample (number of farms)	2	1	5	10	2	8	25
Orchard size classes (ha)	<10	10-20	20-30	30-80	> 80		
Orchard area (ha)	4,824	3,016	2,405	5,669	5,373		21,287
Number of farms	2,711	217	99	122	38		3,187
South Eastern region national sample (number of farms)	10	14	10	29	9		72
Originally selected EFSA sample (number of farms)	0	4	9	4	3		20
Actual EFSA sample (number of farms)	0	4	4	10	2		20

(a): The original sample was based on a single farm after the inclusion of all farms managed sized grouping increased on many holdings

2.1.4.3. Farmer contact and recruitment

The identification of suitable farms and subsequent contact and agreement to participate was an important component for successful data collection. However continued farmer participation from initial contact right through to the collection of last piece of required of information was crucial. Farmer willingness to participate was dependent on a number of factors which included their history of participation in previous surveys, the level of detail in existing pesticide records and availability of their time to complete the lengthy survey requirements. In most countries first contact with farmers through was through a standardised letter and/or telephone call explaining the purpose of the survey, the confidential nature of the survey and the fact that it was voluntary and not an inspection. Some countries used local agronomists or farming associations to aid the farm identification and initial farmer contact. The UK, LT and PL used existing farming contacts from previous surveys whilst in NL initial farm contact details were purchased.

To ensure continuing participation and check the progress of the recording other activities, farmers were contacted regularly by telephone and/or email. The collection of all the required data was often

not possible during single face-to-face interviews and had to be delayed to less busy times (e.g. autumn or winter) when the farmer had more time and willingness for lengthy discussions.

Most countries reported data completeness issues with the use of activity diaries to record other activities. Farmers were unwilling to use a diary as it required too much additional information and a number of countries reported concerns over the completeness of data collected by this method even when the farmers were regularly prompted. Moreover countries also reported difficulties in contacting and arranging follow-up visits during peak seasons and in some cases farmers refused to co-operate any further part way through the survey.

Belgium

In Belgium, an initial letter was sent to all members of farmers' associations who grow the necessary crops. This letter explained the purpose of the survey, the confidential nature of the survey and the fact that it was voluntary and not an inspection. A contact name was provided to potential participants explaining that a member of the survey team would be contacting them to arrange a mutually convenient time to visit. Key issue was finding farmers willing to cooperate with the surveys. Main reasons for not willing to cooperate were:

- no time;
- the extent of data required for the survey; and
- crop protection is a sensitive topic (farmers may use products which are not allowed for use in Belgium but are allowed elsewhere e.g. the Netherlands; farmers do not want more products to be taken out of the market).

All the farm visits were made in the period March - April because these periods fitted with the busy schedule of the farmers. The visits took on average 2.5 hours depending on the size of the farm and recording system used by the farm. During the initial visit, all forms except 3 and 6 were filled in and it was explained to farmers how to record data in form 3 and 6 for the upcoming year.

Once the initial visit was done, contact took place via email or phone on a monthly basis. The ease of this contact varied among farmers, but these contacts were – in general – very useful to remind farmers to fill in the forms 3 and 6. Most farmers were able to confirm that the necessary data were being or would be recorded in form 3 and 6. One farmer informed us that he was no longer willing to participate and another requested a second visit as some problems had arisen.

Farmers were asked to send intermediate results during the monthly contacts via email or phone to allow the quality of the records to be checked. Some were able to send intermediate results, whereas others would only fill in the records at the end of the year.

However, the length of time taken to process and enter the data onto the database took significantly longer, with some holdings taking between two to three days in total to capture and enter all data on a field by field basis.

Greece

The recruitment of farms for all three crops (vegetables, citrus and grapes) was done after contacting local agronomists and farmers associations. Thus, farms with existing detailed records (at least for the pesticide applications) were selected. Moreover, for the final selection, the farmer's willingness to cooperate in recording also other activities was considered.

The farms selected for grapes, plum tomato and cucurbit/pumpkin surveys in Greece are following IPM programs and therefore record keeping is required by their association. A first contact with the local agronomists checking the IPM compliance and consulting the farmers was made between December 2012 and February 2013 in order to identify the farmers' general willingness in keeping records.

In Greece, all farmers (through their association) received a letter explaining the purpose of the EFSA pesticide usage survey, the confidential nature of it and the fact that it was a voluntary survey and not an inspection. A contact name was provided to potential participants explaining that a member of the survey team would be contacting them to arrange a mutually convenient time for a visit or first contact by phone.

In all cases, farmers had originally stated that they had been using pesticides (no organic holdings were included). However, due to financial restriction there were cases in citrus that fields remained untreated. Upon identification of this fact, effort was made to recruit other citrus farmers (also in other areas of the same region) but it was realized that the situation was similar for the surveyed years.

More specifically, following the first contact (by phone) the number of farmers recruited was higher than the required one in order to have a reserve list of farmers. Indeed, due to problems encountered during the data collection and to the fact that some farmers were not willing to co-operate till the end of the project -or denied to provide historical data- additional farmers from the farmers' reserve list were considered.

Most farmers were first contacted by phone during April/May, while the pesticides applications had already started since previous February/March. During the first contact with each farmer an effort was made to see whether he was involved in activities related to Forms 6 (Operator Work Activities) and Form 7 (Non-crop details). The selected farmers in most cases were involved in limited worker activities while all stated that they did not apply pesticides other than those used for crop protection.

Harvesting of plum tomatoes, cucurbits, sweet corn, grapes (both for raisins and wine production) and citrus was performed by contract workers in all cases. The farmer who was also the principal operator was mainly involved in pesticide application and maintenance tasks. Thus, the short delay in the first contact with the farmers has limited impact on the data collection concerning Forms 6 and 7.

Most visits were made to grape and plum tomato farms in October and November as this was after harvesting and therefore a relatively quiet period. In case of citrus the first visit was also made during autumn, before harvesting, but additional visits were made next spring (April and May). The visits lasted for 2 hours on average, depending on the size of the farm, the recording system used by the farm and the availability of the farmer. In a number of cases repeated visits had to be made to collect additional data.

Specifically for Form 6 data, farmers had to be contacted regularly by phone in order to ensure that they had filled in the provided logbooks in case they were involved in any activities other than pesticide application. In some cases local agronomists were asked to remind and/or help farmers with the record keeping.

It should be noted that the time taken to process and enter the data onto the database took significantly longer time than expected, with some holdings needing two to three days in total to capture and enter all data on a field by field basis.

Italy

Data collection started in July 2013 with single initial face-to-face interview and further information were subsequently obtained by interim telephone calls. Data entry was made in the period between February-March 2014.

Lithuania

Firstly the regional inspectors of State Plant Service were asked to advise which of the local farmers would likely be well-disposed to participate in the survey. The initial contacts with farmers were made by phone, afterwards the interview visit were made. Some additional information after visits was collected by phone or e-mail. The majority of farmers were favourable during the first visit when the season had not yet started, but it was difficult to arrange conversations in the peak season, especially having in mind, that there was unusually late spring of 2013 in Lithuania (there was snow on fields until end of April) and, consequently, short growing period. The last visit was foreseen for December 2013, but due to the possibly of unsafe driving conditions, visits to some outlying regions were postponed until end of February - beginning of March 2014.

Netherlands

For the recruitment of farmers over 400 addresses were bought and farmers were sent an initial letter explaining the purpose of the project and asking for participation. Farmers interested in voluntary participation could return a participation form in a cost free envelope. Unfortunately the response was less than 1%. Therefore a larger group of farmers were recruited by electronic mailing and by contacting by phone asking for voluntary participation in the project. Finally 30 farmers were selected for participation in the project

The potato and vegetable farms were visited at the beginning of the project during May and June. During this visit agreements on the further collection of data in view of the project were made. During that visit for all farmers Forms, 1,2, 4 and 5 were filled in and agreements were made on how and when farmers would like to be reminded (for example email of phone call alert on monthly basis) to send their forms in.

Since responses by farmers after the visit to send their filled in forms back were lower than expected, all farmers have been reminded multiple times (by email and phone, much more than anticipated at the beginning of the project) to provide us with the information as requested and agreed. Of the 30 farmers that were included at the beginning of the project 5 farmers withdrew from the project due to various reasons. Since participation of the project was on a voluntary basis, the project had to accept their decision. At the time of withdrawal it was not possible to recruit new farmers in the project since the withdrawal took place near the end of the survey period.

Poland

It should be noted that correspondence contact with farmers in Poland was very difficult - few of them responded to the correspondence received. The most effective method was to the telephone the farmers, describe the purpose of the visit and survey and to arrange an appropriate date and time to visit. Despite multiple attempts it was not possible to collect data on other worker activities (except chemical treatments). We suggested use of additional diaries (in paper or excel form) to collect other activities but it was not completed. Any additional work or load data collection is very difficult to obtain. Interestingly, in Poland, the majority of operators work only on one farm (as owner or as an employee).

Surveys were completed by direct visits. time spent on a single farm varied between 1-4 hours depending on the size of the crop and number of other crops on that farm.

Visits to apple orchards were conducted in April 2014 during the early phase of vegetation. In the current project, it was decided to survey in the second largest Polish fruit-growing region, i.e. the province of Lodz. Visits to wheat and maize farms were carried out at the turn of the year 2013/2014. In the current project, it was decided to perform the surveys in the region of Opole, Wroclaw and Silesia. Surveying vegetable crops was carried out in early 2014.

Data entry took place at the premises of the Institute in Sośnicowice.

Spain

The association of the farmers of Valencia (Federacion de Cooperativas Agro-alimentarias de Valencia) was contacted to collect initial information related to the identification of the most representative locations for each targeted crop. This first contact was made by phone before November 2012. In December the team from UAL made a visit to the facilities of the farmers association to explain the aim of the project and the need to contact representative farmers who would be willing to participate in the survey (including those advised by the associations of farmers or those working independently). During December many emails were exchanged and in another visit in early January 2013 the 6 forms required for the study were explained to the managers of the individual farms.

All farms were visited in January and the team at UAL and the farm association advisors informed the individual farmers of the data required, the purpose of the survey, its confidentiality and voluntary nature. It was clearly explained that the aim of the project was to have a real picture of agricultural practices and it was neither an inspection nor a judgement about their way of working.

Most of the people contacted were willing to participate, but some rejections were made because they already have to manage a lot of documents for getting certification schemes (eg Global Gap) and they were already really busy.

Once the initial visit was made, every month, agronomists from the farmers associations, which collaborated with the UAL team when it visited the farms, in addition contact took place monthly by phone. These visits were just to remind farmers to fill in the forms and helped them to solve any likely doubts they may have. In addition and a few weeks before the application season another visit was made by the UAL team to confirm the willingness of farmers to collaborate. Most of the farmers sent their results during the first months of 2014. However, time taken to process and enter the data onto the database took significantly longer than expected and they were entered in October 2014.

United Kingdom

Having recently completed pesticide usage surveys of both arable and orchard crops for the UK national survey it was possible to identify farmers and growers who may be willing to participate in a more detailed survey. These were also farms that had detailed records, normally computer based, but also farm record books and annotated agronomists spray recommendations. These records also contained information on operator spraying times that may not have been present on other farms selected in the original sample. The sample is therefore biased towards those farms with the most detailed records.

In the UK the initial letter sent to individual growers indicated the level of detail required. Those responding positively were aware of the level of detail required and others that may not have had such detailed records may have been disinclined to respond. Growers contacted in the survey had also recently been involved in the national pesticide survey and given the level of detail required by the EFSA study certain holdings were more suitable than others. Many holdings would not readily be able to provide the level of detail required or be willing to spare the time to participate in such a lengthy survey.

In the UK, all farms (from both visit & reserve lists) received a letter explaining the purpose of the national pesticide usage survey, the confidential nature of the survey and the fact that it was voluntary and not an inspection. A contact name was provided to potential participants explaining that a member of the survey team would be contacting them to arrange a mutually convenient time to visit.

Some holdings (including organic holdings) responded but were rejected for the current survey if they had not made any spray applications during the year of sampling. However, inclusion of organic holdings or those not making any treatments is important in a national pesticide usage survey as it gives an indication of the percentage of a crop that remains untreated.

Farms included in the arable sample were a sub-set of those who had provided data for the 2011 pilot study and who had agreed to provide the additional level of data required for the current study. For the orchard survey farmers were recruited at the same time as the national pesticide usage survey of orchard crops. The level of detail required for the national survey is not as onerous as that required for the EFSA study and the farms selected were those that were willing to provide additional data over and above their existing detailed records. It was essential at the start of the study that those selected, in both the arable and orchard surveys would provide all of the data required throughout the period of the study.

Experience in the UK has shown that the best period for visiting most farmers and growers is the period between November and February inclusive. Some visits can be made in October and March, but October can be a busy period for those harvesting potatoes or late season apples whilst in March planting vegetable crops or preparing the ground for drilling spring cereals or sugar beet can be a limiting factor. However, for protected crops or hardy ornamental nursery stock there is no one ideal time.

Most visits were made to UK arable farms in June and July as this was prior to harvest and therefore a relatively quiet period. For orchard crops, which are normally sprayed on a 10-14 day programme throughout the summer, visits were made in the autumn, between September and December. The visits took on average 3 hours although some took as long as 5 hours, depending on the size of the farm and recording system used by the farm. In a number of cases repeat visits had to be made to collect additional data or alternatively limited amounts of data were collected over the phone.

However, the length of time taken to process and enter the data onto the database took significantly longer, with some holdings taking between two to three days in total to capture and enter all data on a field by field basis.

2.1.4.4. Data capture

Belgium

Crop management records sheets are the most commonly used recording system in Belgium. These sheets are filled in on a field-by-field basis and provide the following information:

- Form 3: date of application, applied product, product dose (per ha), treated area and operator (farmer or spray contractor); and
- Form 6: date of sowing/planting, fertilisation activities, date of harvest.

Although crop management records sheets are most common, other recording systems are often used by the farmer. These records are:

- Application schemes provided by crop advisor.

These are usually very simple and contain information on date of application, applied product and product dose.

- Excel sheets, calendars and agendas.

These are very common but the level of detail varies among farmers, depending on the purpose of records (e.g. calculation of spray application costs, farmers' interest). Some farmers will only record date of application, applied product and applied dose, whereas others may also record spray volume, weather conditions etc. Information on the main crop activities (sowing, planting, fertilisation and harvesting) may also be recorded.

Form 3 information; date of application, applied product and product dose are usually available. Other information (e.g. spray volume, duration of application) is usually not recorded. Form 6 information dates of sowing/planting, fertilisation activities and harvesting are usually available on the crop management records sheets. Other activities such as ploughing or weeding are not recorded.

In general, records of "other activity" data are non-existent or limited to the dates of sowing/planting, fertilisation and harvesting. All farmers were asked to keep detailed records of worker activities. Most farmers were able to do this, but the level of detail of the records seems to be quite variable. The farmers who filled out the forms quite well, were contacted and were asked whether it was possible to obtain also some data of the past 5 years. The response to this was negative. Again the same main reasons lie at the basis of the failure to obtain some data.

Greece

In Greece, data were collected from existing farm management systems in place on farmers' association or from farmers own spray record books and farm diaries.

The suggestion of the use of additional logbooks to collect other spraying activities or work related activities was accepted initially but it required frequent contact with the farmers. The requirement for collection of additional data led some farmers to quit providing detailed records through the whole project period and therefore resulted in incomplete data overall.

Detailed information on the boundary features of selected environmental fields was readily available in most cases, while historical data were collected wherever available.

Information on spray operators (Form 4) was obtained through personal interviews. During the farm visit the surveyors could inspect the PPE and sprayers used. However, information on the time duration (number of spraying days) between first use of PPE and cleaning or disposal was based on estimation made by the farmer during the interview.

Information on the type of the sprayers used (Form 5) was readily available and -with the exception of nozzle types- most of the questions were quite straightforward. Whilst some sprayer information was contained in Farm Management Software programmes, it was not recorded in all instances thus this information had to be obtained during the interview with the farmer.

Italy

Data on pesticide application (Form 3) were collected based on spray record books and farm diaries kept by farmers. According to the Italian legislation, farmers are obliged to keep these records. Most of the time these were in "written paper format" and were collected during the farm visit. During the farm visit the other required information (Form 1, 2, 4, 5 and 6) were collected through a face-to-face interview. Additional phone calls have been made to integrate data especially referring to Form 3 and Form 6 to fulfil the project requirement of having detailed information on pesticide use within the period of 12 months. Unfortunately, because of the large amount of information requested, it was not possible to collect additional previous historical data.

Lithuania

There is a legal requirement in Lithuania to keep records of pesticides usage on a farm, including field location, crop type, name and amount of PPP used, date and treated area. Seed treatments, disinfection / inspection of grain or potatoes stores and other non-crop uses must be recorded as well. An entry into prescribed register should be made within 24 hours after each application. However in reality the majority of famers keep free-form diary records and transfer them into established forms either once or on several occasions per season. Information about operators, IPM, buffer strips, spraying equipment, PPE used, other work activities were collected specially for the project. The majority of farms had records of pesticides usage for the previous 2-3 years for the environmental fields.

Netherlands

The potato and vegetable farms were visited at the beginning of the project during May and June. During this visit agreements on the further collection of data in view of the project were made. During that visit for all farmers Forms, 1,2, 4 and 5 were filled in and agreements were made on how and when farmers would like to be reminded (for example email of phone call alert on monthly basis) to send their forms in.

Since responses by farmers after the visit to send their filled in forms back were lower than expected, all farmers have been reminded multiple times (by email and phone, much more than anticipated at the beginning of the project) to provide us with the information as requested and agreed. Of the 30 farmers that were included at the beginning of the project 5 farmers withdrew from the project due to various reasons. Since participation of the project was on a voluntary basis, the project had to accept their

decision. At the time of withdrawal it was not possible to recruit new farmers in the project since the withdrawal took place near the end of the survey period.

Unfortunately for none of the farmers we were able to get all the information retrieved from them. For example for 19 out of 30 farmers we received more or less completed Forms 3 over 2013. Despite the fact that the majority of farms were using some form of Farm Management Software some parameters were not part of the registration system like crop stage, application round, duration and start of application and thus not recorded/provided. Also receiving historical spray data turned out to be quite problematic.

Following the decision by EFSA in the summer of 2013 only limited data have been recorded on the worker activities, (Form 6) especially since also the farmers indicated that it was too much work to record the 'other activity' data in the level of detail as requested for the project. They also reported they couldn't provide this information retrospectively, and that having to provide this information was considered a reason for not being willing to participate in the project anymore. Therefore, it was decided that we would no longer urge the farmers to provide this information, but focus on the other parts of the project (with regard to application of pesticides and the historical data).

Poland

The data on pesticide application (Form 3) were collected based on spray record books and farm diaries (written paper) and sometimes based on software. According to Polish law it is obligatory for farmers to keep such records. These are the subject of official control performed by Plant Health and Seed Inspection. There was no problem with data collection to Forms 1, 2, 4, 5. Unfortunately there were no systematic records for Form 6 and taking to account lack of information we left out this form. It was possible to collect some data about other activities like mowing in orchards, or pruning but precise data on first entry or other applications were not available.

Spain

In Spain crops management normally includes a set of records sheets, which are filled in the field. Most of them are compulsory and required for the sale of produce either into local markets or for exportation. In addition all farms are certified at least by one private scheme, mainly global gap, but also local schemes with a protected indication of origin. Although some data already collected related to other activities that are already recorded, eg, date of sowing/planting, fertilisation activities, date of harvest, we further emphasised the specific needs of this project, asking for the additional information required for the project.

The sheets were usually provided by the agronomists/advisors and were completed primarily with the information relating to plant protection product´s applications, which is related with form 3, 4: date of application, applied product, product dose per treated area; operator; pest; sprayers; Personal Protective Equipment; PPP storage conditions; PPP cleaning, etc.

In order to avoid "resistance" to ongoing collaboration, we decided not to change their usual recording sheets and just to complete missing information with our own forms. In addition some calculations were necessary in order to convert the information provided by farmers to appropriate units, for example, sometimes it was only the total amount applied to the cropped area but not the measured rate per Ha.

The same can be said about information regarding the technical specifications of sprayers, for example changing nozzles is usually performed once per season or "when necessary". Information about sprayer´s/nozzle´s characteristics was found using in information provided by manufacturers.

The total sprayed volume per hectare was measured in some applications, but in other cases it was not measured but estimated assuming the full tank volume, the normal fill levels and that the farmers are generally spraying the whole tank volume.

Calculations and (mainly) extracting the data from the original farmer´s sheets to our own forms was quite time consuming; this was the reason to start the data entry into the database in October.

United Kingdom

In the UK most data were collected from existing farm management software already in place on the farm. In some cases the farmers had their own software systems, spray record books and farm diaries. Because of the legal requirements in place to record the usage of all PPP and in order to comply with crop assurance schemes that require the same level of detail, record keeping in the UK is comprehensive with over 99% of PPP usage already being recorded.

This level of detailed record keeping means that visits to any of the farmers selected in the UK sample could take place at almost any convenient point in the year and result in the data requirements for this study to be met.

The suggestion of the use of additional diaries to collect other spraying activities or work related activities was not accepted as an option by any of the UK farms selected. It was felt that the collection of additional data may lose farmers part way through the process and therefore result in more incomplete data overall. In addition, those that were willing to use a diary were concerned that they would forget to complete it throughout the year, again resulting in incomplete data.

The only areas of usage which proved more difficult to collect, as they were not already regularly recorded, was the usage of herbicides around farm buildings, barren strips, roadways, on potato dumps and in the garden. Usage of insecticides within farm grain stores is already a requirement for many of the UK crop assurance schemes. Information on these areas had to be requested and was obtained using either a diary (normally the farmers own diary) or, in some cases the farmer's memory. The most important approach was to ask the right questions in order to derive an answer (yes or no, how much, when & for how long). Use of Forms 7 and 8 ensured that searching questions on areas of PPP usage outside the "normal" usage could be made.

Compared to the previous pilot study the collection of data was, in some ways, more straightforward, in that the additional information on workers and multiple operators on the farm was not required. However, the level of detail required for the principal operators spraying activities was more onerous, particularly in the UK where one operator could be working on up to 10 farms. In addition, the collection of the principal operators other work activities proved to be too great for this study and would have resulted in some farmers or growers leaving the process part way through. The decision of EFSA, in the summer of 2013, to make the worker activities a low priority meant that surveyors could concentrate on the collection of the most important data, that relating to PPP.

Data collection on both Forms 1 and 2 was straightforward. Cropping information was readily available as was information on a farmer or growers approach to integrated pest management.

In the UK there was always good information on pesticide applications (Form 3) and in most cases operator spray times (start and finish) were available as this data is a requirement for many of the crop assurance schemes in the UK and is regularly accessed by crop assurance assessors. Within the database there may possibly be some confusion/duplication in treated areas and operator spraying

times where a molluscicide applicator was used at the same time as liquid foliar applications (e.g. by hydraulic sprayer). Care is needed in the data extraction and interpretation to account for this.

Detailed information on the boundary features of selected environmental fields was readily available although there was a contrast in the availability of historic data sets between arable and orchard farms. Most of the arable farms selected were using farm management software (normally Gatekeeper or Muddy Boots) and historical data were readily available as they had been using these systems for several years. By contrast, the orchard farms were mainly using paper records and the information on historical usage was not as readily available. Bearing in mind the length of time taken to extract the data manually from paper based systems and the decision by EFSA to reduce the priority of historical data meant that in some cases the collection of this data was not pursued.

Information on spray operators (Form 4) was readily available on farms in the UK. The type of PPE was sometimes recorded, particularly with regard to the type of PPE worn during mixing & loading, making spray applications and cleaning down the sprayer. During the farm visit the surveyors could inspect the PPE and sprayers to complete some of the information required. However, information on the length of time (number of spraying days) between first use of PPE and cleaning or disposal was often difficult to obtain.

Information on the sprayers used (Form 5) was readily available and with the exception of nozzles most of the questions were quite straightforward. Whilst some sprayer information was contained in Farm Management Software programmes, it was not recorded in all instances and this information had to be obtained by direct questioning of the farmer. For example - which sprayers would be used in each scenario (herbicide usage, foliar applications, granular applications etc.)? For most arable farms there was only a single sprayer, for orchards two sprayers were used, one for herbicide applications, and one for foliar applications of insecticides, fungicides etc.

There was often only limited information on the nozzle manufacturer but good information on the type of nozzle – air inclusion, flat fan etc. The length of time between nozzle renewals was often estimated. On some horticultural sprayers two types of nozzles could be used simultaneously. There were often scenarios in which a specific type of nozzle would be used, for example the use of Albuz TVI nozzles in orchards for chlorpyrifos applications. This area of data collection could be significantly improved by the addition of a question relating to the drift qualities (particularly low-drift) of each nozzle. The removal of TE (Tee Jet) as a category in any future surveys is necessary as Tee Jet is obviously a manufacturer with many types of nozzle.

Following the decision by EFSA in the summer of 2013 only limited data have been recorded on the worker activities, (Form 6). However, these relate to activities such as crop rogueing, drilling treated seed, picking and pruning which may take the principal operator back into a treated field.

2.1.5. Re-prioritisation of the original tender specification

The time required on each farm to capture all the information was significantly longer than expected for all members of the consortium. This was due to the larger than expected volume of data that was required to be captured (e.g. in the pilot survey data was collected for all spray operators on the farm and only for the sampled farm, in this study data was required for all farms for which the principal operator worked). At the project meeting with EFSA (25/07/13) and captured in the subsequent minutes, the importance of the data to be collected was prioritised as detailed below. The worker activities of the principal operator was the lowest priority and it was suggested that these should be 'cut first'.

- Main priority - complete data set for the 1 year on the environmental field and all operator activities of the principal operator (including on other fields/farms, however excluding contract operators), i.e. complete data captured in Form 3.
- Next priority - capture the non-crop related operator activities (e.g. grain storage etc) and amateur uses (which must be identifiable as amateur uses also). Same priority for the historical data for the environmental fields.
- Lowest priority - worker activities of operators.

2.2. Development of a database suitable for the collation of survey data

2.2.1. Design of the database

The database developed (Capex2) was made available to consortium members on the internet to allow the entry of data. The database uses a MySQL relational database, and the web front-end using Adobe ColdFusion.

- MySQL – Is an open-source relational database running on Debian Linux.
- Adobe ColdFusion and Apache web server is a web application and server software running on commodity hardware and Linux.

The template for the XSD files was agreed, which allowed a test transmission of data from the database to EFSA. Examples of the database screen views are shown in the Figures 1-11 below.

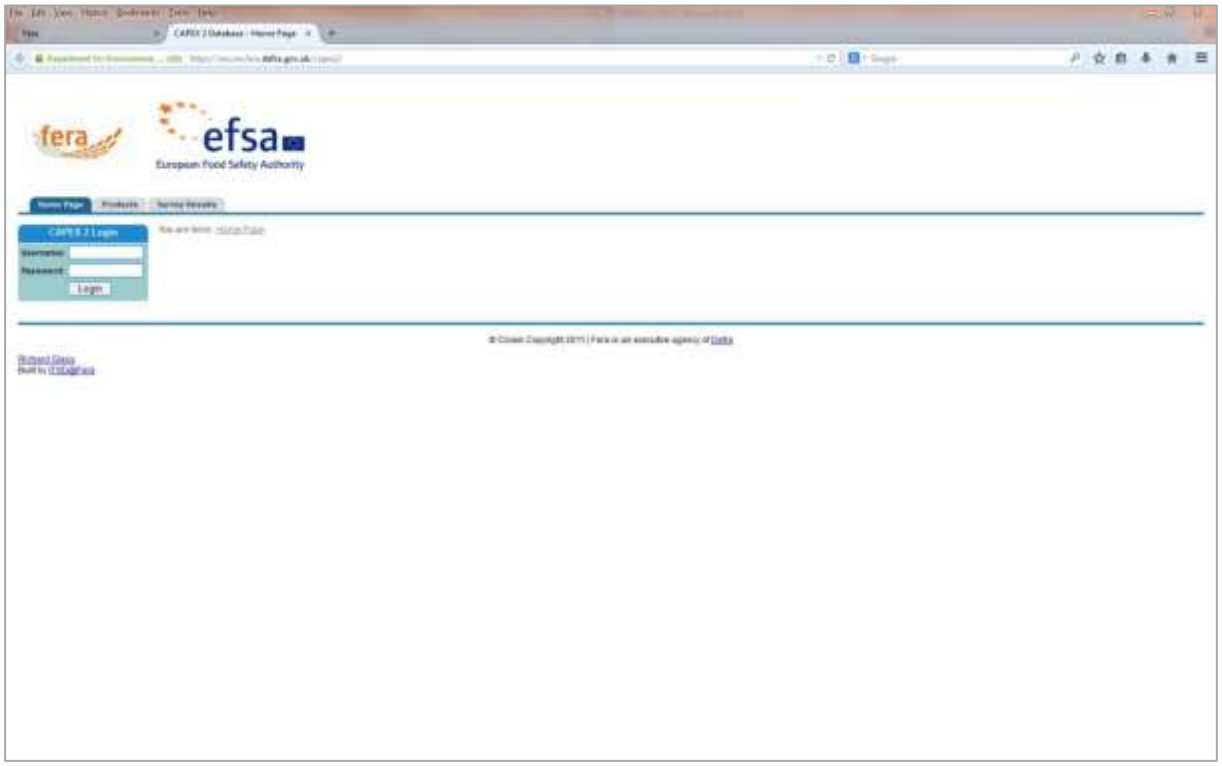

Figure 1. Log in screen for Capex2 database

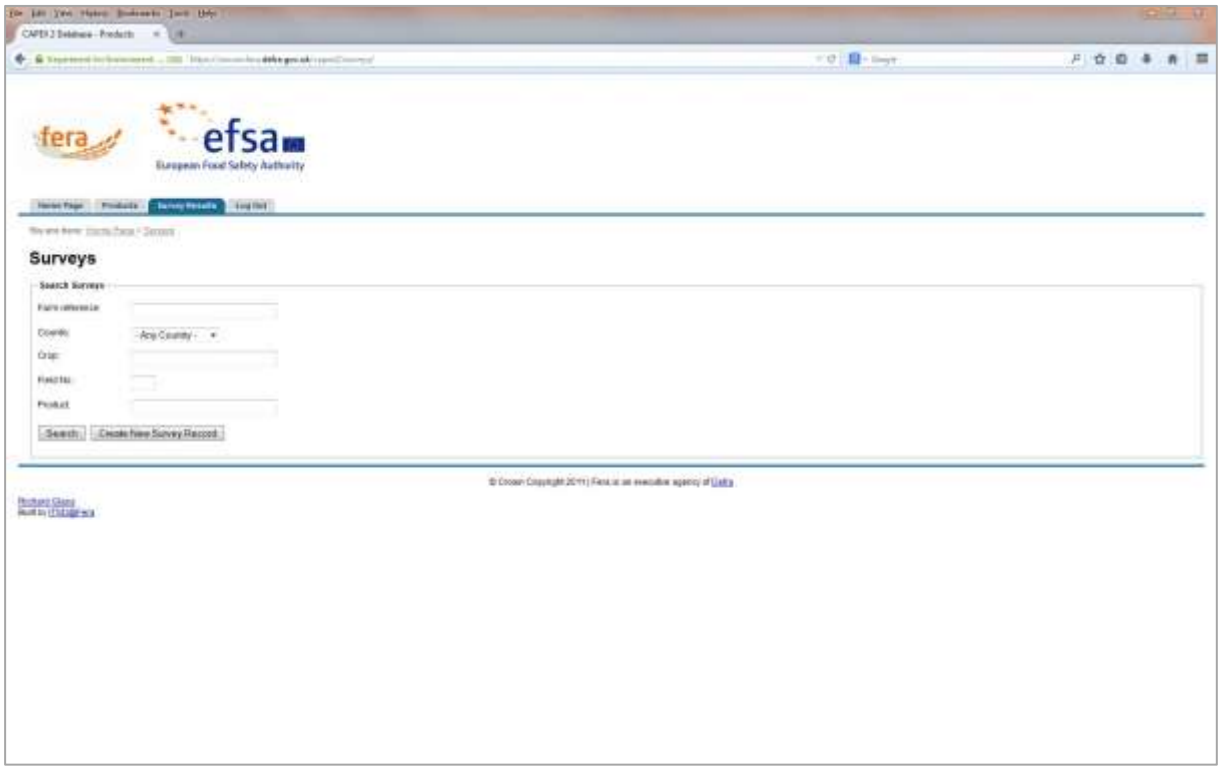

Figure 2. Page to set up a new database entry or search for existing data set

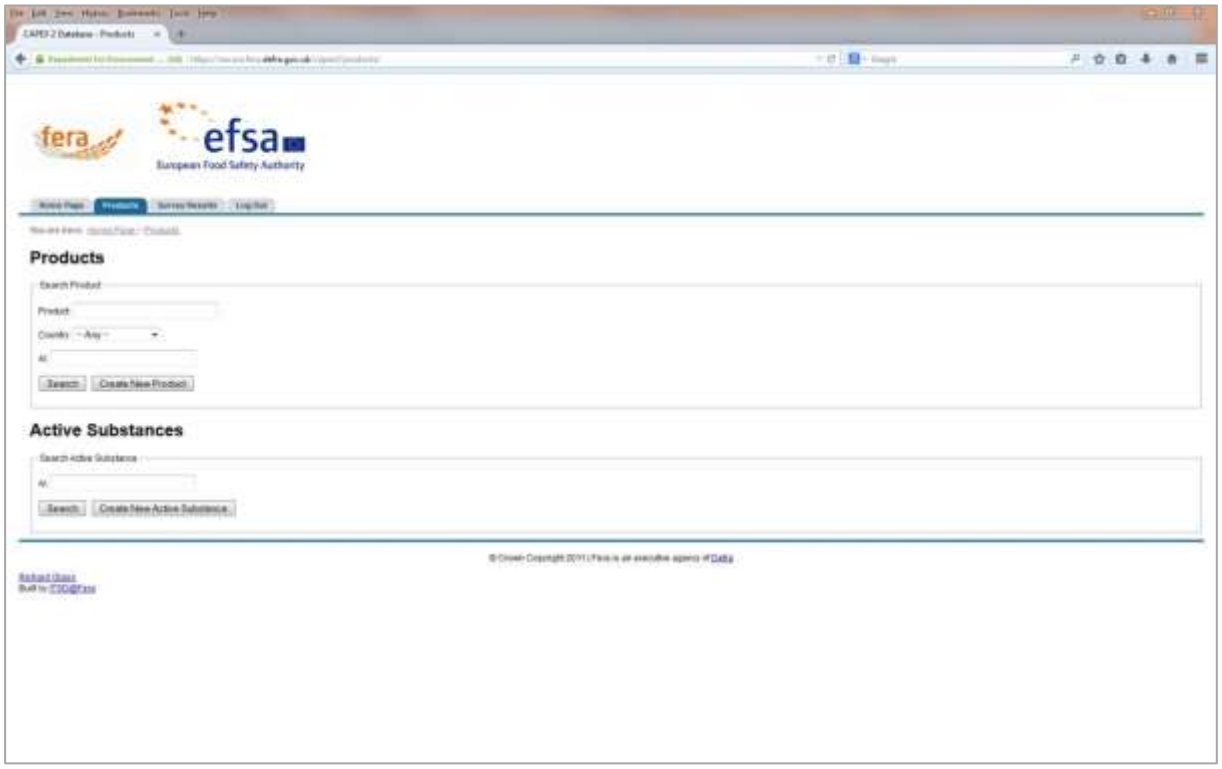

Figure 3. Page to search for existing products or active substances

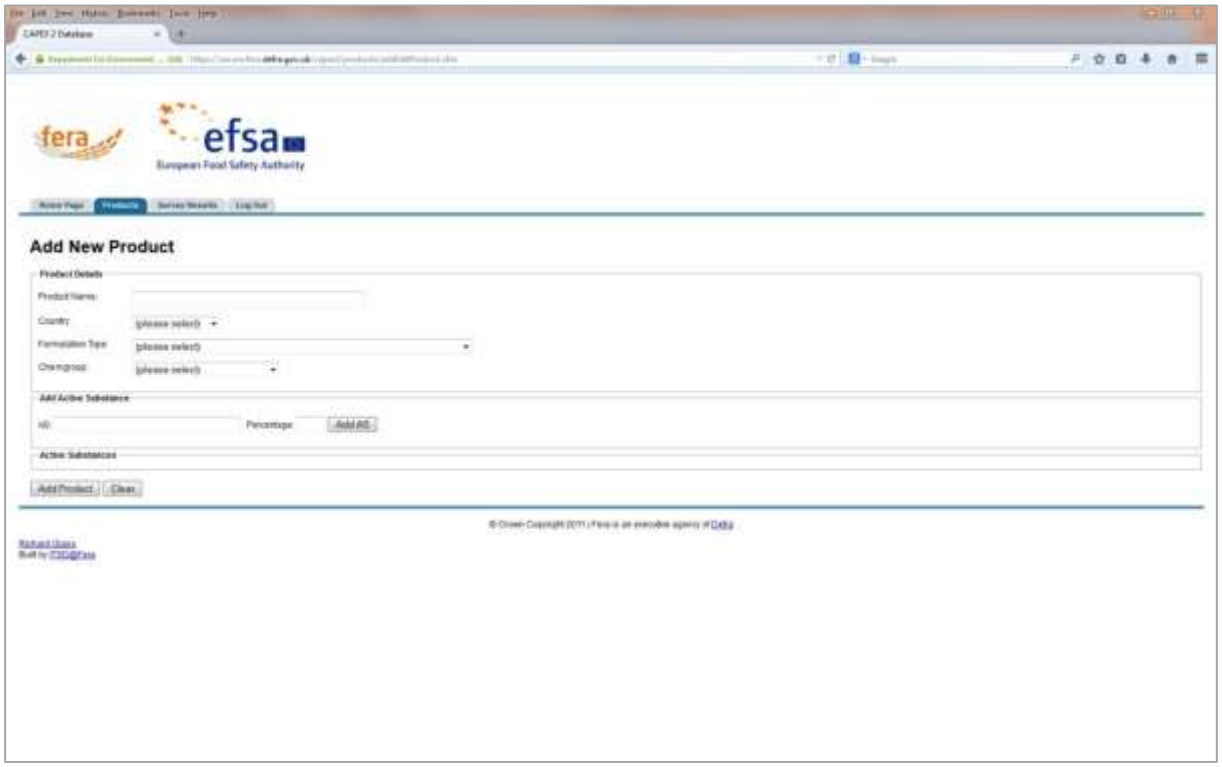

Figure 4. Page to enter a new product for a particular country

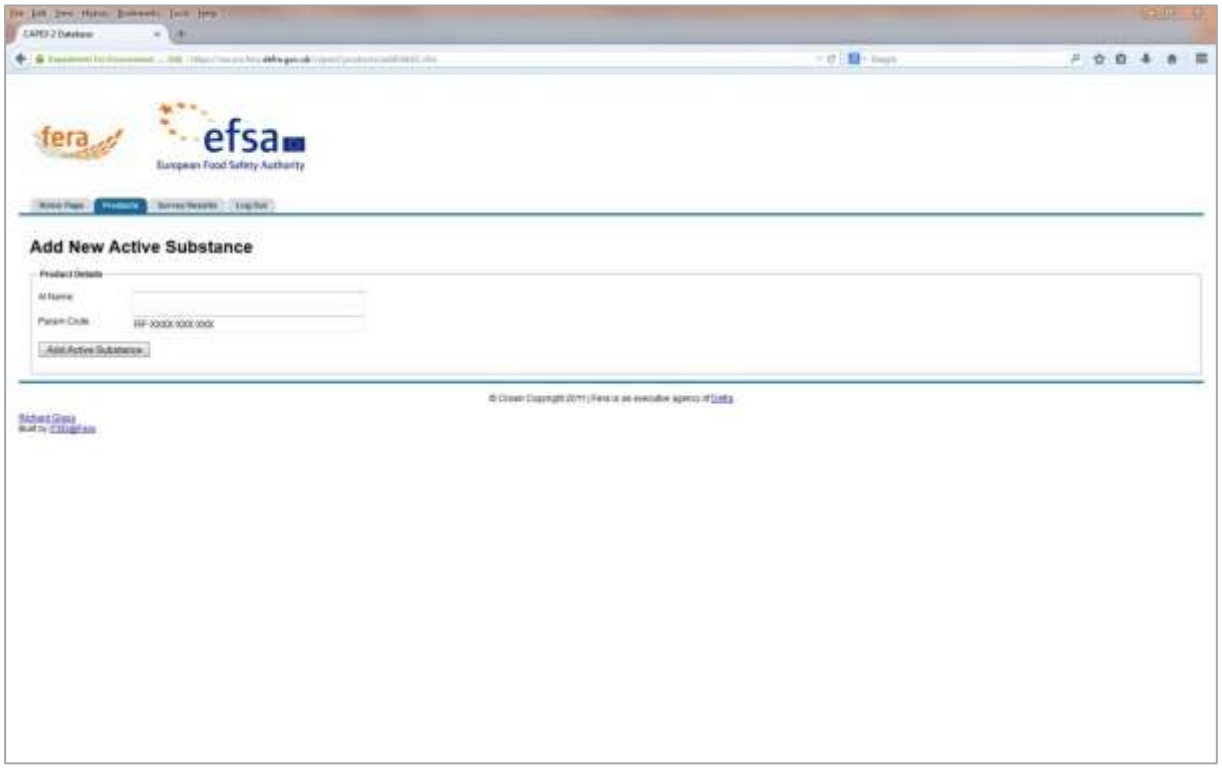

Figure 5. Page to enter a new active substance for a particular country

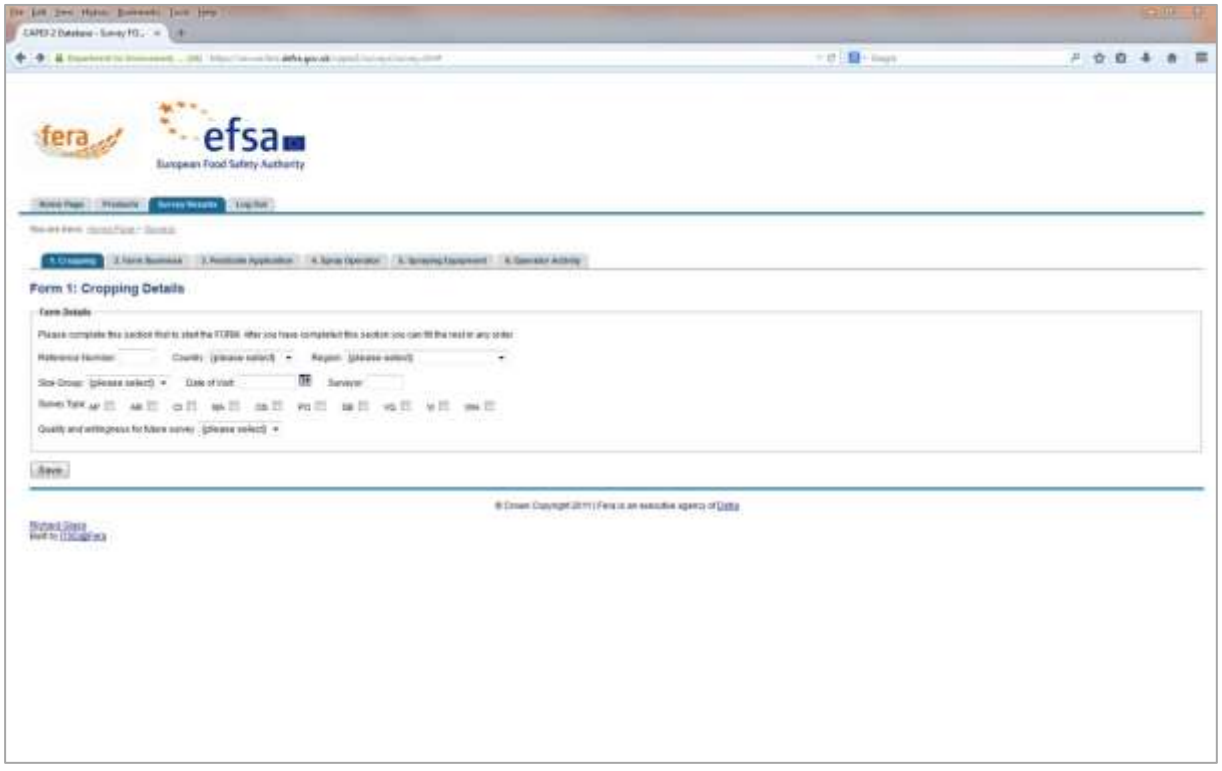

Figure 6. Page to enter data for the cropping details (Survey Form 1)

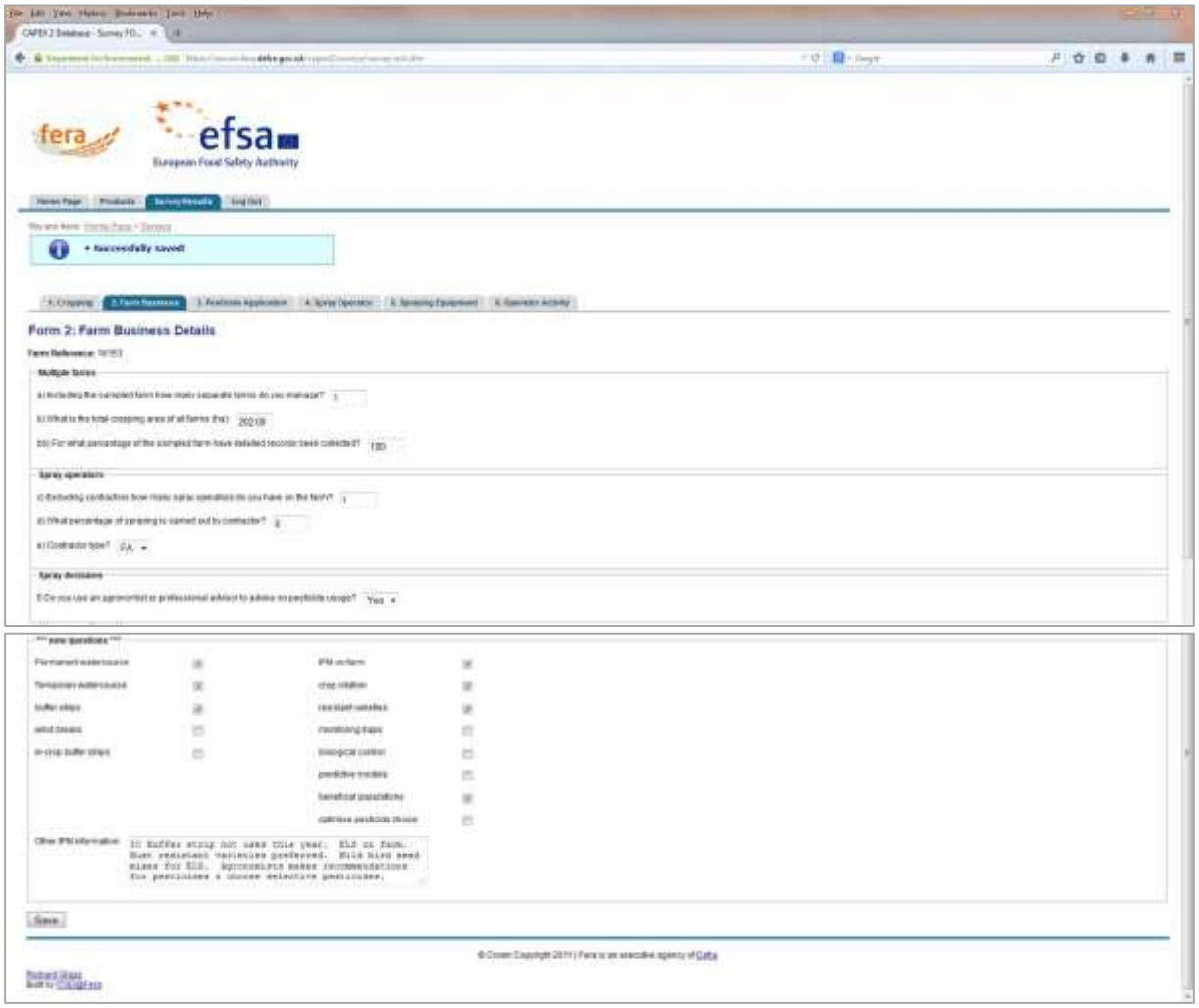

Figure 7. Page to enter data for the farm business (Survey Form 2)

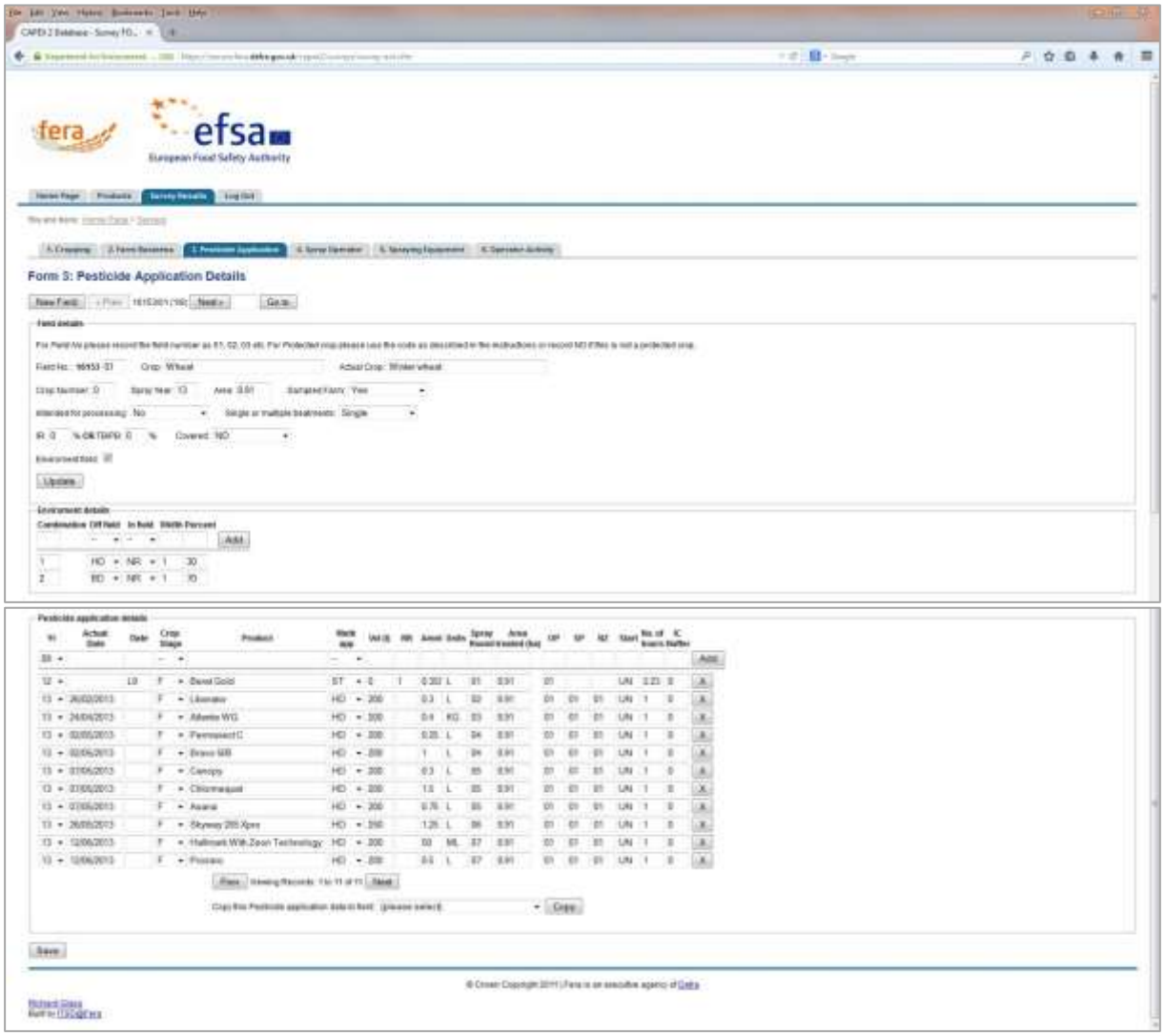

Figure 8. Page to enter data for the pesticide application (Survey Form 3)

Figure 9. Page to enter data for the spray operator (Survey Form 4)

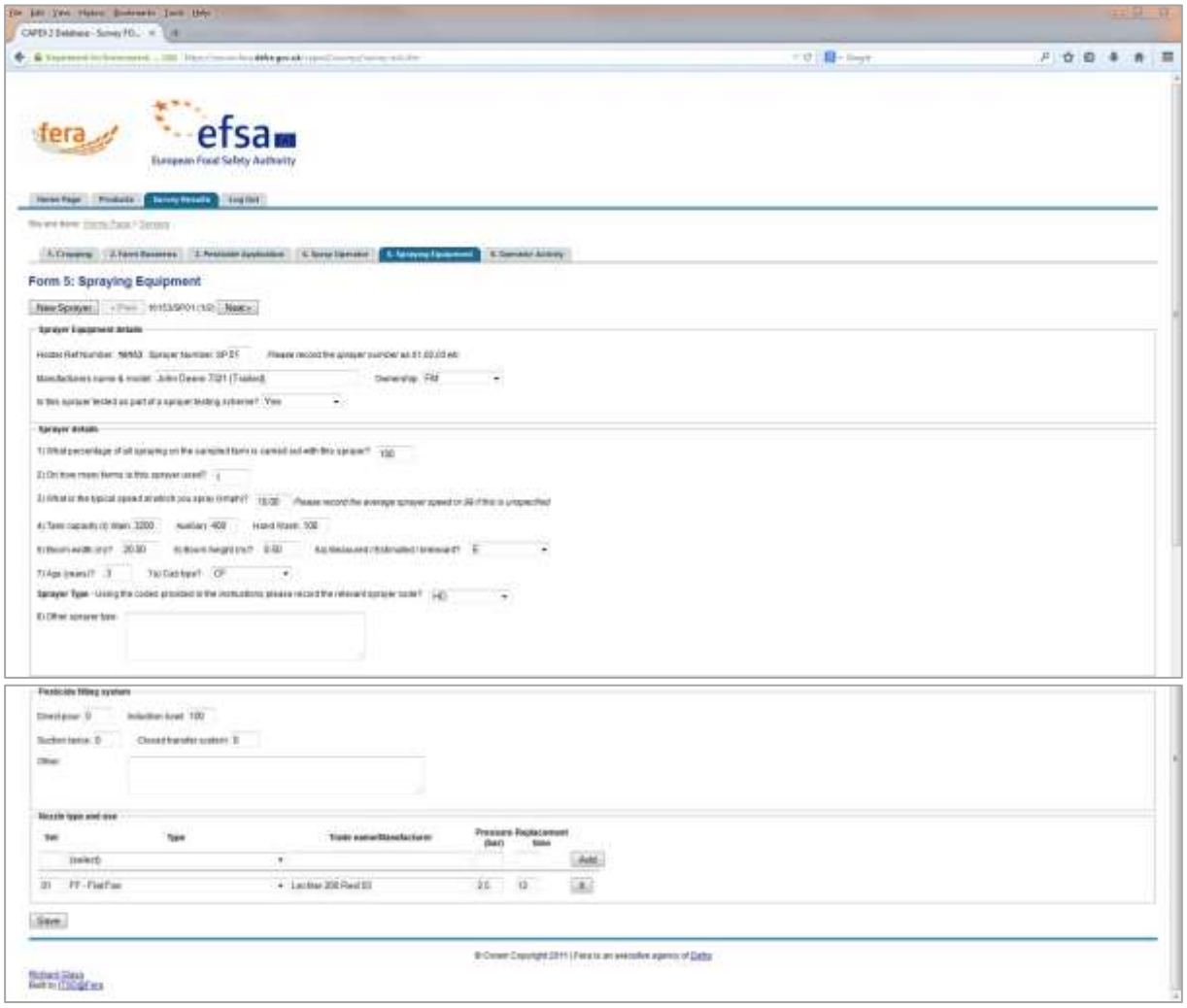

Figure 10. Page to enter data for the spraying equipment (Survey Form 5)

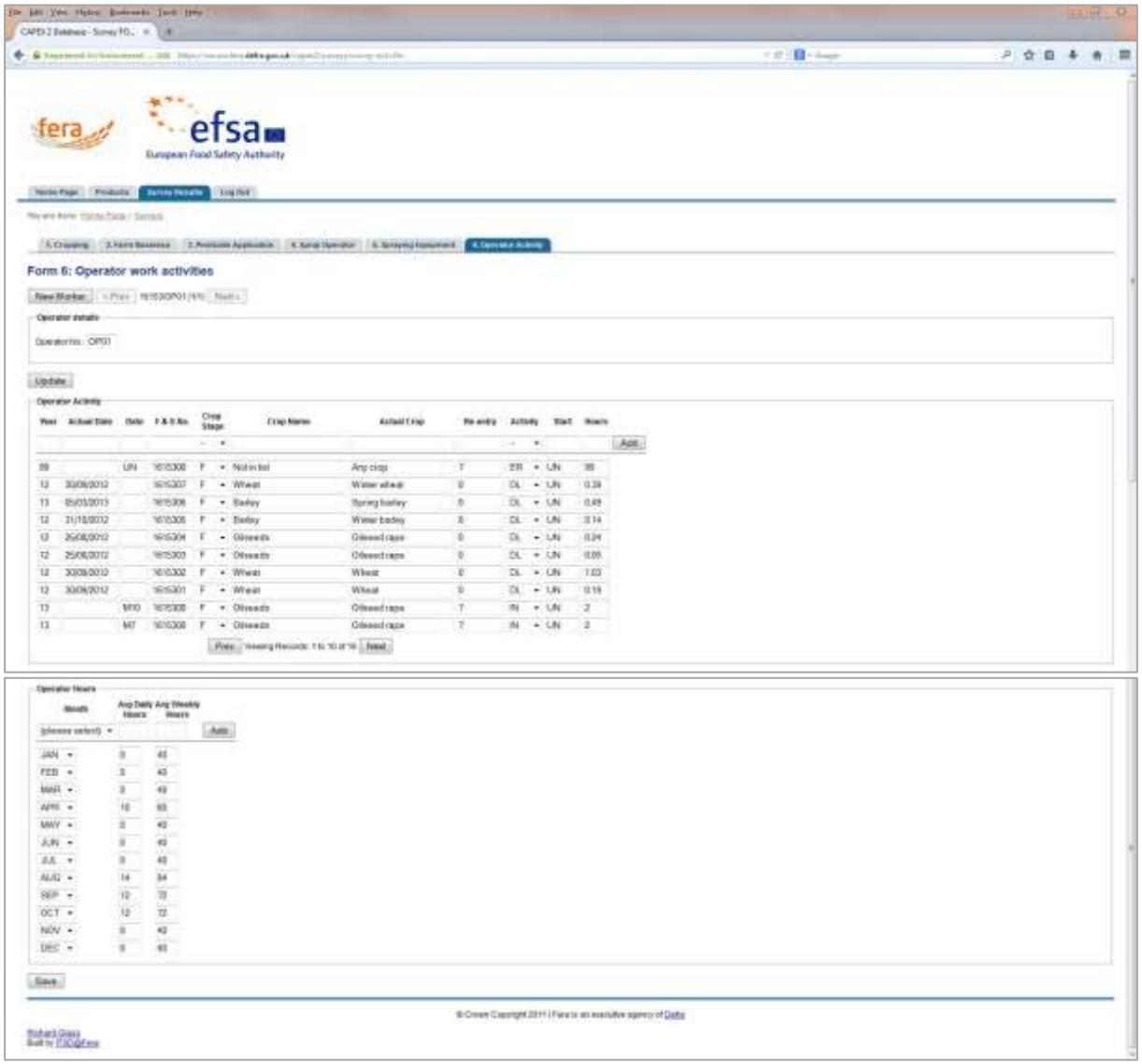

Figure 11. Page to enter data for the operator activities (Survey Form 6)

2.2.2. Data entry and output with database

Each consortium member was given access to the database in via unique username and login. The data input by each consortium member, via a web portal, was regulated through a detailed user interface that will ensure the use of the finite list of controlled terminology. The data checking protocols to identify any incorrect data entries have been developed to identify obvious erroneous data. Although the database construction included features to minimise entry of erroneous data, significant resources have been required to modify the database during the data input period in response to comments from the consortium.

It is important to ensure that the confidentiality of an individual's is maintained, this is more difficult where a specialist crop is grown by only one or two people in a region. Having knowledge of cropping within a region could allow an observer to easily identify an individual growing a specialist crop.

2.2.2.1. Error checking

The following is a brief outline of the error checking routines that have taken place in order to standardise the data sets. Most of the work has focussed on Form 3 and in particular the implications for standardisation of data that could be used for operator exposure models.

Error checking routines were run and circulated to all partners in the project. Copies of all of the SQL used and results obtained are available if needed.

1. Areas treated – Form 3 – Basic checks to ensure that the area treated did not exceed the area grown and that the area sprayed per day was feasible. Where necessary the original records were checked with each of the countries concerned.

2. Continuity – All forms – Checks to ensure that all required tables were present and that they all joined back to Form 1. In some cases there were gaps in the data and some forms were not completed for some countries. Either because data were not available or because a farmer dropped out of the study.

3. Crop issues – Form 1 & Form 3 – Checks to ensure that the actual crop matched the EFSA code. In most cases the EFSA code had to be changed.

4. ERA fields – Form 3 – Checks needed to be made on the required number of ERA fields for each country within 2013. All ERA fields (marked by a Y) had to have field margin data present.

5. Excessive hours – Form 3 – Calculations were made on the daily hours spent spraying. Any values over 12 hours were circulated to each of the individual countries to check.

6. Historical data – Form 3 – Initially there were two different methods in recording this data, but this was obviously standardised to a single method. Checks were made between spray dates, survey year and year on Form3a to ensure consistency.

7. Methods of application – Form 3 - including consistency with Form3/Form5 – Some misinterpretation of sprayer codes had occurred and these had to be rectified. Sprayer number and method of application in Form 3 had to be consistent with sprayer number and type in Form5.

8. Mixing & Loading – Form 4 – Checks had to be made on the length of time spent mixing and loading as there were some high values.

9. Nozzles – Form 5 – Lot of mixing of names and nozzle types. An attempt was made to standardise the nozzle types and give an indication of a nozzles low-drift potential.

10. Operator – Form 4 – There are some issues on the percentage spent spraying. An attempt has been made to identify these and update the database accordingly.

11. Product changes – Product table & Form 3 – during the transfer of data from Capex to Capex2 some changes were made and the link to the correct active substance was lost. There were issues for all countries other than Lithuania and the Netherlands who were using the database for the first time. All of the issues relating to the current product list have been updated but there are still some issues with products from the previous survey.

12. Rates of application – Form 3 – This mainly involved looking at very high rates of application. In doing this there are inevitably some high rates of application (closer to the normal recommended label rate) that have been missed. A new list will be circulated to all countries to attempt to remove these errors. A maximum rate linked to crop could be added to the database to avoid this but would be extremely expensive.

13. Seed treatments – Form 3 – This only looked at UK data and was used to update seed treatment rates on a range of crops.

14. Spraying rate per hectare – Form 3 – As for 1 above this was concerned entirely with establishing whether the work rates (hectares sprayed/hour) were correct. For some larger machines with booms over 30 metres the area sprayed per day can be very high.

15. Spray-round consistency – Form 3 – This was the most crucial error check required for calculating operator exposure. In order to not overestimate exposure all values (with the exception of product, recommended rate, actual rate and units) need to be consistent. If not all data within one spray round (tank mix) can be duplicated, triplicated etc. depending on the number of errors.

2.3. Evaluation of data and identification of uncertainties

Compared to the previous survey each of the countries (excluding Lithuania and the Netherlands) had already had experience in the collection of data. This experience was shared with both of the new countries.

The quality of data on the database is high although there are uncertainties within a small number of areas.

The data collected and presented within Form 2 gives an indication of the percentage of spray records for each of the principal spray operators. For most the percentage is 100%, however there are a small number of records where the percentage is less than 100% and these data should be treated with caution.

The quality of the Form 3 data is high although there are individual areas where there may be uncertainties. In particular the information relating to whether a crop will be processed after harvest has been a question difficult to answer. Obviously crops such as olives for oil production, rape seed

and sugar beet require processing before they can be used as a final product. However, in many cases the farmer or grower did not know whether there would be any degree of processing before it became a final product. In particular, crops such as apples, blackcurrants and gooseberries can be marketed fresh or processed as juice or a canned fruit.

Whilst the data for ERA fields were single fields, data collected for some of the other fields may have been amalgamated. Whilst the amalgamated data are ideal for calculating operator exposure, they are not suitable for calculating the number of spray applications on individual fields.

The issue of calculating the number of spray applications (spray rounds), products and active substances on individual fields (even when these are marked as S) is further complicated by the fact that spray applications made by anyone other than the principal spray operator would not be included. These calculations are only possible on the ERA fields.

Times spent spraying by the principal operator are available for most countries. However, data that cannot be used are indicated with a "99" or unknown value within the nhours column.

Having the start time and duration of sprays is really helpful for building a picture of insecticide spray times – particularly with relation to pollinators. However, even where the start time is missing and replaced with "UN" for unspecified, the data are still valuable and useful for analyses.

The collection of data for Form 4 was relatively straightforward and changes to the data entry screen have meant that PPE data for both spraying and work activities can be recorded within database tables 4, 4a and 4b.

Sprayer information on Form 5 was unchanged from the previous survey and other than boom height, which was often estimated, there were no issues with the basic sprayer questions. However, there are some questions on the nozzle data as the question relating to low-drift status was only added retrospectively. It was only possible to add low drift status information where the actual name of each nozzle was recorded. Therefore there are a number of nozzle types which could be low-drift, but which cannot be recorded as such because there is insufficient information.

Form 6 is where most uncertainties lie and data from this form are likely to be incomplete for many farms. In many cases the Form 6 information is missing completely as the collection of these data were considered a low priority following meetings in 2013. Where a record is present, normally those collected earlier in 2013, the data collected are as comprehensive as could be collected at the time of the visit(s). Form 6 contains some extremely useful information on weekly working and the range of work activities conducted by the principal operator.

However, in some cases it is not possible to link the field number in Form 6 to the field number in Form 3 as the work could have taken place in any one of a number of fields. Instead the crop name has been specified and the assumption is that work activities appearing on Form 6 could have taken place in any one of the fields in which the specified crop was grown.

Work related activities that took the principal operator into the crop (drilling and filling the seed drill, pruning, picking etc.) were included wherever possible.

Other activities, particularly those where the farmer was in a tractor or combine, such as ploughing, cultivating the field, harvesting etc., were not recorded as it was felt that these didn't take the farmer into the crop. Earliest return dates were recorded wherever possible.

3. Results

The planned Capex2 error checking was completed on 22nd October 2014, significantly later than expected due to the delays in data entry. The analysis of the dataset as a whole and data relating to operator exposure and environmental risk assessment performed and presented in the subsequent sections of the report were performed during November 2014. These analyses were undertaken with data downloaded from the Capex2 database between 5th and 12th November 2014. The data for the case studies (Section 3.3.1) was downloaded between 8th and 9th December 2014. Following these downloads the Capex2 database continued to be updated following additional error checking and data issues based on comments from EFSA during Nov/Dec 2014 and responding to comments on the draft report in Feb/Mar 2015. It was not feasible to keep updating the data analyses and all the presented tables each time a correction within the data was implemented. Therefore where corrections have changed the data in the table significantly the table has been updated where changes have limited impact on the presented data the tables have not been changed. A footnote has been added to each table to indicate when the data within the table was downloaded.

3.1. Survey summary

A summary of the data collected by the collaborators in eight countries are provided in **Table 11**. Data were collated from one country in the Northern regulatory zone (Lithuania), four countries from the Central regulatory zone (Belgium, Netherlands, Poland and United Kingdom) and three countries from the Southern regulatory zone (Greece, Spain and Italy). In excess of 400 farms were surveyed (419) with over 36,000 row of PPP application data collated.

Table 11: Summary of the operator exposure and environmental data collated in study

Number of .. (Form number)	BE	ES	GR	IT	LT	NL	PL	UK	TOTAL
Farms (1)	37	60	75	81	31	29	61	45	419
Farms (2)	37	60	72	81	31	29	61	45	416
Fields – 2013 (3)	209	75	509	115	185	72	273	1376	2814
Fields – historical (3)	0	0	77	0	70	0	0	70	237
PPP applications – 2013 (3a)	2683	372	3231	1899	638	1411	1899	16770	28903
PPP applications – historical (3a)	0	0	2381	0	621	0	0	4453	7455
Environmental fields (3)	69	64	116	77	70	19	83	82	580
Principal operators (4)	36	60	72	81	31	28	61	45	414
Principal operator/sprayer usage (4a)	38	76	115	95	31	55	61	117	588
Principal operator PPE combinations (4b)	514	777	1242	5232	393	425	524	1148	10255
Sprayers (5)	38	78	118	103	31	58	87	132	645
Nozzle sets (5a)	63	79	129	160	78	100	125	204	938
Principal spray operators – work activities (6)	28	65	78	77	31	29	12	45	365
Principal spray operator detailed worker activities (6a)	1250	462	1859	454	280	443	32	1760	6540

(a): Principal operator/sprayer usage is a summary of an operators management of each sprayer and includes frequency of use and the time taken for mixing & loading and cleaning each sprayer
(b): Principal operator PPE combinations for mixing & loading, cleaning the sprayer, PPP applications and work activities
(c): March 2015 download data

The activities of 370 principal spray operators which included, including mixing and loading, cleaning the sprayer, PPP application and other activities were collated to provide detailed information on non-dietary exposure. The survey also collated information on over 580 fields designated as 'environmental fields' which included in- and off- field margin information and, where available, historical pesticide usage data for the last five years. A summary of the environmental field country/crop combinations are provided in Table 12. Information on at least twenty environmental fields from twenty different farms for each crop was collated in at least two different countries. Where available, and as agreed with EFSA, individual farms could have more than one environmental field if they grew more than one target crop for that country. None of the environmental fields for a specific crop/country combination came from the same farm. The survey included farms/fields producing crops for direct consumption and for processing. In most cases it was relatively straightforward to identify which crops were used for direct consumption and those used for processing with crops such as sugar beet and oilseed rape always requiring some degree of processing before human consumption. It was more difficult to determine the ultimate use of certain crops, such as apples, where some crops were grown specifically for juicing, whilst others are grown primarily for the fresh market with only the out-grades being used for juicing.

Historical PPP application data for the environmental field were only collated by three countries (Greece, Lithuania and United Kingdom) (Table 13). Five or more years of historical PPP application data were only available for 15.7% of environmental fields.

Table 12: Summary of environmental fields surveyed

Number of farms	BE	ES	GR	IT	LT	NL	PL	UK	TOTAL
Wheat					25		23	22	71 (3)
Potatoes	24				24	10			58 (2)
Oilseed rape					21			20	41 (2)
Maize	25			21			20		66 (3)
Sugar beet	20							20	40 (2)
Apples				16			20	20	56 (2)
Citrus		24	20						44 (2)
Grapes		20	26	20					66 (3)
Vegetables		20	70	20		9	20		139 (4)
TOTAL	69	64	116	77	70	19	83	82	580

(a): Data in parenthesis are the number of country/crop combinations for each crop with ≥ 20 environmental fields
(b): March 2015 download data

Table 13: Summary of the number of environmental fields with historical PPP application data

PPP application data	BE	ES	GR	IT	LT	NL	PL	UK	TOTAL
1 year	69	64	39	77	0	18	83	13	363
2 years	0	0	19	0	9	1	0	2	31
3 years	0	0	17	0	27	0	0	8	52
4 years	0	0	25	0	13	0	0	6	44
≥ 5 years	0	0	16	0	21	0	0	53	91
TOTAL	69	64	116	77	70	19	83	82	580

(a): 1 year = 2013
(b): March 2015 download data

The minimum requirements on the size and distribution of the survey as detailed in the original tender specification were met:

- At least 1 country from Northern regulatory zone (actual 1);
- At least 3 countries from the Central regulatory zone (actual 4);
- At least 3 countries from the Northern regulatory zone (actual 3);
- A minimum of 400 surveys (actual 419 total, 394 with complete data); and

- A minimum of 20 farms for each crop from two different countries (actual nine crops with a minimum of 20 farms for each crop from at least two different countries).

3.2. Details of the farms surveyed

It can be seen from Table 14 that complete information was collected from a total of 394 farms (some farms (22) did not provide any pesticide data), representing 2,814 fields. However, for the purposes of this study groups of fields were also referred to as "fields" and therefore the actual number of physical fields is likely to be significantly larger than this.

Table 14: Overview of the number of farms, fields and field areas by country

Country	Number of farms	Number of fields	Maximum number of fields per farm	Total area per holding (ha)			
				Mean	SD	Minimum	Maximum
BE	30	209	15	62.5	58.5	3.6	330.0
ES	60	75	1	2.2	1.8	0.1	8.5
GR	75	509	28	13.4	17.9	1.0	106.4
IT	77	115	4	53.7	71.7	0.9	400.0
LT	31	185	12	128.1	146.1	3.6	619.2
NL	15	72	11	39.2	36.8	2.0	128.5
PL	61	273	11	103.2	217.8	0.6	1229.0
UK	45	1376	174	273.0	426.6	12.3	1839.1

(a): SD = standard deviation
(b): November 2014 download data

There is an obvious contrast between the maximum number of fields per holding and the countries sampled. All of the ERA fields are single fields, with a full spray programme. Some of the data in the non-ERA fields are aggregated and whilst this prevents accurate calculations on the number of applications made to individual fields it ensures that all of the PPP applications made by an operator are captured. However, the accurate calculation of spray passes, numbers of products etc. on the non-ERA fields was never going to be possible as data were only collected on the principle operator. Any applications by secondary operators were not recorded and therefore the field records for non-ERA fields are complete for the principal operator but potentially incomplete in terms of the total sprays applied. For Spain a single field or orchard was sampled, whereas in the UK this increased to 174 fields. One of the reasons for the large discrepancy is that the level of detail provided by UK farms was so great that it was considered most sensible to split, rather than aggregate fields on some farms to avoid error. From the previous survey there were difficulties in amalgamating some of the UK arable data as it was difficult to calculate a combined spraying time for fields sprayed on the same day. Overall farm size was indicative of the crops being grown with arable farms in the UK and Poland having the largest field area. The largest size of farms in Lithuania was significantly smaller, despite arable crops (wheat, oilseed rape and potatoes) also being sampled. Where a range of contrasting crops were grown there was a disparity between the smallest and the largest field size. Farms in Greece and Italy included both vegetable crops, which can be grown on relatively small areas and grape vines which can be grown over a much larger area.

Figure 12 provides details on the size range of the environmental fields whilst Table 15 shows the vast range of crops, 67 in total, sampled in the survey. Included within the list are non-crop areas (farm yards, barren strips, etc.) and not in list crops which was primarily fallow ground.

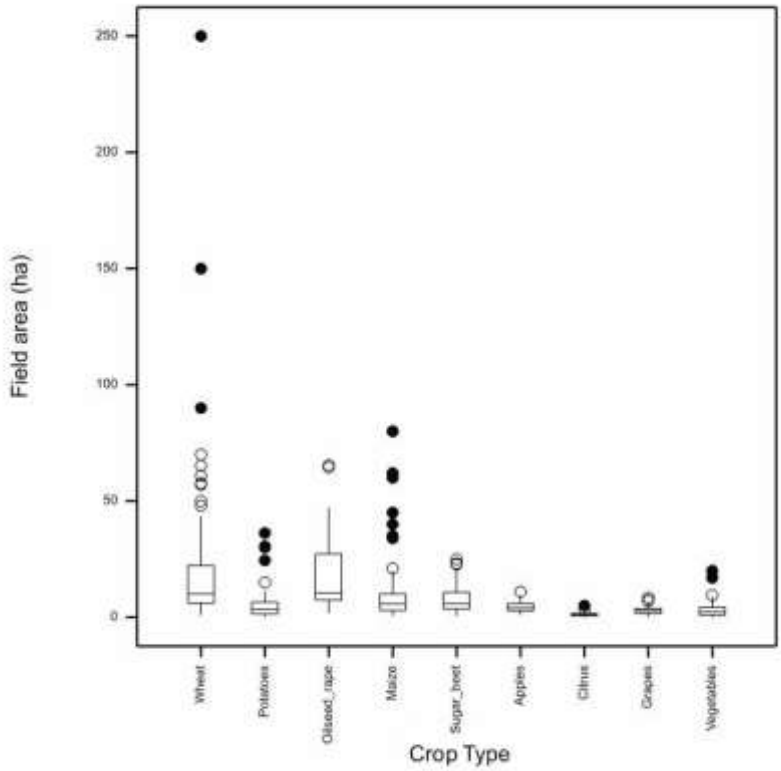

Figure 12. Environmental field areas (ha) for the nine crop types surveyed in the eight MS countries

Table 15: Overview of the number of fields per crop per country (including grouping of crop types)

Crop type	Crop group	Total number of fields	Number of fields per country							
			BE	ES	GR	IT	LT	NL	PL	UK
Apples	Apples	195				16			21	158
Apricots	Orchards	9			9					
Asparagus	Vegetables	1								1
Aubergines (egg plants)	Vegetables	1			1					
Barley	Arable crops	181	5				20		18	138
Beans (dry)	Arable crops	23								23
Beans (with pods)	Vegetables	11	9	1	1					
Beetroot	Vegetables	4					1		3	
Broccoli	Vegetables	13								13
Carrots	Vegetables	28	5	2			2	1	18	
Cauliflower	Vegetables	20	3	5						12
Celeriac	Vegetables	1	1							

Crop type	Crop group	Total number of fields	Number of fields per country							
			BE	ES	GR	IT	LT	NL	PL	UK
Celery	Vegetables	7		1					6	
Cherries	Orchards	18							10	8
Chicory roots	Vegetables	4						4		
Cucumbers	Vegetables	2							2	
Currants (red, black and white)	Soft fruit	15							5	10
Cut flowers	Ornamentals	1							1	
Fennel	Vegetables	1							1	
Garlic	Vegetables	1							1	
Globe artichokes	Vegetables	3		3						
Gooseberries	Soft fruit	3								3
Grass	Grassland & fodder	12	4			1	2	2		3
Head cabbage	Vegetables	13	2				1		9	1
Hops, dried, including hop pellets unconcentrated	Hops	7								7
Leek	Vegetables	6	4	2						
Lettuce	Vegetables	6						6		
Linseed	Oilseeds	6								6
Maize	Maize	206	52		82	31	3	3	33	2
Mandarins	Citrus	25		8	17					
Mustard seed	Arable crops	6								6
Oats	Arable crops	10	1				5		1	3
Oilseeds	Oilseed rape	2					1		1	
Olives for oil production	Olives	53			52	1				
Onions	Vegetables	33	2	1				8	6	16
Oranges	Citrus	103		12	91					
Other cereals	Arable crops	25	2			1	11		9	2
Other kind of root and tuber vegetables except sugar beet	Vegetables	4	2				1			1
Parsley	Vegetables	11						1	10	
Parsley root	Vegetables	1							1	
Parsnips	Vegetables	1		1						
Peaches	Orchards	8			8					
Pears	Orchards	32			2				7	23
Peas (dry)	Arable crops	51					3			48
Peas (with pods)	Vegetables	7	5					2		
Peas (without pods)	Vegetables	7								7
Peppers	Vegetables	4			4					
Plums	Orchards	20							6	14
Potatoes	Potatoes	194	46		13	1	26	22	20	66
Pumpkins	Vegetables	45			45					
Rape seed	Oilseed rape	206					34		19	153
Raspberries	Soft fruit	2								2
Rye	Arable crops	5					3		2	
Sorghum	Arable crops	2				2				
Soya bean	Arable crops	6				6				
Strawberries	Soft fruit	4	2				1			1
Sugar beet	Sugar beet	200	35				1	8	7	149
Sunflower seed	Arable crops	1				1				
Sweet corn	Vegetables	5			5					
Table grapes	Grapevine	9			9					

Crop type	Crop group	Total number of fields	Number of fields per country							
			BE	ES	GR	IT	LT	NL	PL	UK
Tomatoes	Vegetables	155			132	23				
Turnips	Vegetables	1		1						
Watermelons	Vegetables	16		3	13					
Wheat	Wheat	634	29			12	60	15	56	462
Wine grapes	Grapevine	66		20	25	20				1
Non crop use	Non crop use	39					10			29
Not in list	Non crop use (5) / Arable crops (3)	8								8

(a): November 2014 download data

3.2.1. Details of the active substances and products applied on farms

Table 16 provides details of the average number of active ingredients, formulations, products and sprays (spray rounds/spray passes) applied to each of the environmental field crops in each country in 2013. Table 17 provides similar data but on a per crop per country basis also including the average mass of active ingreinets applied.

Spray round is the term used to describe the entry into a crop or field by a sprayer. It refers to the constituents of a spray tank and can include single products or a group of products. Where multiple products are used in a single sprayer tank the spray round number is the same for all. It therefore acts as a linking number for the contents of a tank mix. Where the average number of sprays is in Tables 16 and 17 are 1.0 this indicates that it could be an infrequent use, and in fact it could have only been applied to a single field. Whilst the number of active substances and products applied per country per environmental field crop types, and per country per crop are shown in Table 18 and Table 19, respectively. The top five active ingredient and formulated mixtures (by area applied) per country per crop are provided in Table 20.

Table 16: The average number of active ingredients, formulations, products and sprays (spray rounds/spray passes) applied to each of the environmental field crops in each country in 2013

Country	Crop	Average number of active ingredients	Average number of formulations	Average number of products	Average number of sprays
BE	Maize	6.32	4.12	4.12	1.44
	Potatoes	29.42	21.75	21.75	13.46
	Sugar beet	19.4	14.35	14.35	5.5
ES	Beans (with pods)	14.0	14.0	14.0	6.0
	Carrots	5.0	5.0	5.0	4.0
	Cauliflower	3.4	3.2	3.2	2.4
	Celery	5.0	5.0	5.0	2.0
	Globe artichokes	10.0	10.0	10.0	5.33
	Leek	5.5	5.5	5.5	3.0
	Mandarins	4.09	4.09	4.09	2.82

Country	Crop	Average number of active ingredients	Average number of formulations	Average number of products	Average number of sprays
	Onions	4.0	4.0	4.0	2.0
	Oranges	4.38	4.38	4.38	2.54
	Parsnips	2.0	2.0	2.0	2.0
	Turnips	4.0	4.0	4.0	2.0
	Watermelons	8.33	8.33	8.33	3.67
	Wine grapes	6.35	5.6	5.6	3.45
GR	Oranges	6.3	6.1	6.10	4.1
	Pumpkins	3.13	3.13	3.13	2.18
	Sweet corn	4.6	3.6	3.6	3.6
	Table grapes	11.67	8.0	8.0	6.0
	Tomatoes	15.7	12.1	12.1	7.3
	Wine grapes	26.7	21.95	21.95	12.35
IT	Apples	40.56	39.0	39.0	25.56
	Maize	7.33	4.71	4.71	3.33
	Tomatoes	24.7	20.1	20.1	11.85
	Wine grapes	37.55	30.05	30.05	13.95
LT	Potatoes	6.13	4.25	4.25	3.42
	Rape seed	4.81	4.05	4.05	3.48
	Wheat	5.48	3.76	3.76	2.92
NL	Chicory roots	17.67	17.67	17.67	9.0
	Lettuce	30.0	23.0	23.0	9.0
	Onions	41.75	38.0	38.0	20.75
	Potatoes	36.3	26.1	26.1	19.1
PL	Apples	24.9	24.5	24.5	21.65
	Carrots	6.0	5.38	5.38	4.63
	Maize	2.7	1.55	1.55	1.35
	Onions	9.75	7.75	7.75	6.5
	Wheat	8.83	6.22	6.22	3.91
UK	Apples	37.0	34.0	34.0	16.85
	Peas (dry)	11.0	9.0	9.0	4.0
	Rape seed	14.5	12.05	12.05	7.55
	Sugar beet	17.05	10.45	10.45	5.4
	Wheat	18.27	11.91	11.91	6.09

(a): March 2015 download data
(b): irrespective of the pesticide groups used in the tank mixes

Table 17: The average number of active ingredients (and mass), formulations, products and sprays (spray rounds/spray passes) applied to each of the environmental field crops in each country to each crop in 2013

Country	Crop	Chemical class	Average number of sprays	Average number of active ingredients	Average mass of active substance (kg)	Average number of formulations	Average number of products
BE	Maize	Herbicide	1.44	6.32	1.55	4.12	4.12
	Potatoes	Defoliant	1.25	1.25	0.08	1.25	1.25
		Fungicide	11.67	23.21	9.08	16.13	16.13
		Growth regulator	1.0	1.25	2.26	1.25	1.25
		Herbicide	2.08	5.17	4.19	4.58	4.58
		Insecticide	1.36	1.36	0.29	1.36	1.36
	Sugar beet	Fungicide	1.0	1.85	0.33	1.0	1.0
		Herbicide	4.8	17.95	5.31	13.5	13.5
		Insecticide	1.0	1.33	0.05	1.0	1.0
		Molluscicide	1.0	1.0	0.20	1.0	1.0
ES	Beans (with pods)	Insecticide	6.0	14.0	0.30	14.0	14.0
	Carrots	Fungicide	2.0	2.0	0.45	2.0	2.0
		Herbicide	1.0	1.0	0.20	1.0	1.0
		Insecticide	2.0	2.0	0.47	2.0	2.0
	Cauliflower	Acaricide/insecticide	1.0	1.0	0.10	1.0	1.0
		Fungicide	2.0	3.0	3.41	2.0	2.0
		Insecticide	2.0	2.6	0.20	2.6	2.6
	Celery	Fungicide	2.0	2.0	0.97	2.0	2.0
		Insecticide	2.0	3.0	0.14	3.0	3.0
	Globe artichokes	Insecticide	5.33	10.0	1.05	10.0	10.0
	Leek	Fungicide	2.5	2.5	2.47	2.5	2.5
		Insecticide	3.0	3.0	0.13	3.0	3.0
	Mandarins	Acaricide	2.33	2.33	0.14	2.33	2.33
		Acaricide/insecticide	2.0	2.0	0.04	2.0	2.0
		Fungicide	1.0	1.0	2.40	1.0	1.0
		Herbicide	2.0	2.0	0.28	2.0	2.0
		Insecticide	1.55	1.91	22.20	1.91	1.91
		Insecticide/nematicide	1.0	1.0	0.01	1.0	1.0
	Onions	Insecticide	2.0	4.0	0.14	4.0	4.0
	Oranges	Acaricide	1.5	1.5	0.16	1.5	1.5
		Acaricide/insecticide	1.0	2.0	0.07	2.0	2.0
		Fungicide	1.25	1.25	3.36	1.25	1.25
		Growth regulator	1.0	1.0	0.02	1.0	1.0
		Growth stimulant	1.0	1.0	0.04	1.0	1.0

Country	Crop	Chemical class	Average number of sprays	Average number of active ingredients	Average mass of active substance (kg)	Average number of formulations	Average number of products
		Herbicide	2.5	4.25	2.88	4.25	4.25
		Insecticide	1.31	2.0	19.96	2.0	2.0
		Molluscicide	1.0	1.0	0.30	1.0	1.0
	Parsnips	Herbicide	2.0	2.0	0.43	2.0	2.0
	Turnips	Insecticide	2.0	4.0	0.75	4.0	4.0
	Watermelons	Acaricide	1.0	1.0	0.20	1.0	1.0
		Acaricide/insecticide	1.0	1.0	0.10	1.0	1.0
		Fungicide	3.33	5.33	6.96	5.33	5.33
		Insecticide	1.33	2.33	0.15	2.33	2.33
	Wine grapes	Fungicide	2.5	4.7	13.58	3.95	3.95
		Insecticide	1.78	1.83	1.16	1.83	1.83
GR	Oranges	Fungicide	1.5	1.83	0.96	1.5	1.5
		Growth regulator	1.0	1.0	0.02	1.0	1.0
		Herbicide	1.17	1.17	0.82	1.17	1.17
		Insecticide	3.63	5.38	13.54	5.38	5.38
	Pumpkins	Fungicide	2.09	2.73	1.39	2.73	2.73
		Insecticide	1.29	1.29	0.02	1.29	1.29
	Sweet corn	Herbicide	1.0	2.0	1.91	1.0	1.0
		Insecticide	2.6	2.6	0.13	2.6	2.6
	Table grapes	Fungicide	5.33	10.5	21.64	6.83	6.83
		Growth regulator	1.0	1.0	0.53	1.0	1.0
		Herbicide	1.0	1.0	0.72	1.0	1.0
	Tomatoes	Fungicide	5.75	10.3	6.90	6.7	6.7
		Herbicide	1.22	1.89	0.72	1.89	1.89
		Insecticide	3.47	3.89	0.23	3.89	3.89
	Wine grapes	Fungicide	11.0	22.83	8.28	17.56	17.56
		Herbicide	2.0	2.53	1.31	2.53	2.53
		Insecticide	5.0	5.0	1.02	5.0	5.0
IT	Apples	Acaricide	1.0	1.0	0.18	1.0	1.0
		Acaricide/insecticide	1.54	1.85	5.87	1.62	1.62
		Fungicide	19.81	26.56	17.10	26.31	26.31
		Fungicide/insecticide	1.0	1.0	0.85	1.0	1.0
		Growth regulator	2.91	4.55	0.13	2.91	2.91
		Herbicide	3.0	3.33	1.44	3.33	3.33
		Insecticide	7.19	7.31	1.74	7.31	7.31
	Maize	Herbicide	2.52	5.95	2.53	3.57	3.57
		Insecticide	1.85	2.23	0.10	1.85	1.85

Country	Crop	Chemical class	Average number of sprays	Average number of active ingredients	Average mass of active substance (kg)	Average number of formulations	Average number of products
	Tomatoes	Acaricide	1.0	1.13	0.04	1.13	1.13
		Acaricide/insecticide	1.14	1.14	0.02	1.14	1.14
		Fungicide	7.25	14.9	7.85	10.55	10.55
		Growth regulator	1.17	1.17	0.64	1.17	1.17
		Herbicide	3.35	7.05	3.00	6.8	6.8
		Insecticide	1.71	1.82	0.14	1.82	1.82
	Wine grapes	Acaricide/insecticide	1.0	1.0	3.92	1.0	1.0
		Fungicide	13.05	34.55	43.04	27.05	27.05
		Herbicide	2.0	2.67	0.98	2.67	2.67
		Insecticide	2.41	2.47	0.47	2.47	2.47
LT	Potatoes	Defoliant	1.0	1.0	0.3	1.0	1.0
		Desiccant	1.0	1.0	0.4	1.0	1.0
		Fungicide	2.22	4.28	1.91	2.28	2.28
		Herbicide	1.35	1.47	0.84	1.41	1.41
		Insecticide	1.7	2.15	0.07	1.75	1.75
	Rape seed	Desiccant	1.0	1.0	0.4	1.0	1.0
		Fungicide	1.18	1.45	0.21	1.27	1.27
		Herbicide	1.58	1.89	1.41	1.74	1.74
		Insecticide	1.75	2.4	0.08	1.85	1.85
	Wheat	Fungicide	1.37	2.05	0.3	1.53	1.53
		Growth regulator	1.31	1.46	0.86	1.31	1.31
		Herbicide	1.61	2.91	0.89	1.74	1.74
		Insecticide	1.14	1.71	0.04	1.14	1.14
NL	Chicory roots	Fungicide	1.0	1.0	0.14	1.0	1.0
		Herbicide	6.0	14.33	5.15	14.33	14.33
		Insecticide	2.67	2.67	0.18	2.67	2.67
	Lettuce	Fungicide	8.0	18.0	11.43	11.0	11.0
		Herbicide	1.0	2.0	0.9	2.0	2.0
		Insecticide	9.0	10.0	0.21	10.0	10.0
	Onions	Fungicide	8.0	16.0	12.04	12.25	12.25
		Growth regulator	1.0	1.0	2.25	1.0	1.0
		Herbicide	11.0	22.75	6.19	22.75	22.75
		Insecticide	1.75	1.75	0.01	1.75	1.75
		Sprout suppressant	2.0	2.0	4.5	2.0	2.0
	Potatoes	Fungicide	14.5	26.6	9.75	16.40	16.4
		Growth regulator	1.50	1.5	1.76	1.5	1.5
		Herbicide	4.3	5.9	4.74	5.9	5.9

Country	Crop	Chemical class	Average number of sprays	Average number of active ingredients	Average mass of active substance (kg)	Average number of formulations	Average number of products
		Insecticide	3.38	3.63	0.08	3.63	3.63
		Nematicide	1.0	1.0	1.0	1.0	1.0
		Sprout suppressant	1.33	1.33	3.0	1.33	1.33
PL	Apples	Acaricide	1.0	1.0	0.1	1.0	1.0
		Fungicide	16.4	17.5	15.71	17.2	17.2
		Growth regulator	2.0	2.0	0.11	2.0	2.0
		Herbicide	2.05	3.75	2.98	3.65	3.65
		Insecticide	3.45	3.45	0.28	3.45	3.45
	Carrots	Fungicide	2.45	3.18	0.79	2.45	2.45
		Herbicide	2.31	2.88	1.06	2.88	2.88
		Insecticide	1.44	1.67	0.5	1.44	1.44
	Maize	Herbicide	1.3	2.65	1.49	1.5	1.5
		Insecticide	1.0	1.0	0.08	1.0	1.0
	Onions	Fungicide	3.0	5.0	2.88	3.0	3.0
		Growth regulator	1.0	1.0	3.2	1.0	1.0
		Herbicide	2.5	3.25	1.39	3.25	3.25
		Insecticide	1.67	1.67	0.06	1.67	1.67
	Wheat	Fungicide	2.47	5.11	0.83	2.95	2.95
		Growth regulator	1.29	1.88	0.74	1.82	1.82
		Herbicide	1.23	2.64	0.63	1.82	1.82
		Insecticide	1.5	1.6	0.15	1.6	1.6
UK	Apples	Acaricide	1.0	1.0	0.14	1.0	1.0
		Acaricide/insecticide	1.0	1.0	0.1	1.0	1.0
		Fungicide	13.8	25.55	14.59	23.95	23.95
		Growth regulator	3.19	3.5	0.17	3.5	3.5
		Herbicide	1.83	4.44	3.71	2.89	2.89
		Insecticide	4.35	4.55	1.38	4.55	4.55
	Peas (dry)	Fungicide	1.0	3.0	0.6	2.0	2.0
		Herbicide	3.0	6.0	2.42	5.0	5.0
		Insecticide	2.0	2.0	0.01	2.0	2.0
	Rape seed	Fungicide	3.1	5.25	0.56	3.85	3.85
		Herbicide	3.75	5.65	2.49	4.6	4.6
		Insecticide	2.0	2.11	0.05	2.11	2.11
		Molluscicide	2.29	2.29	0.27	2.29	2.29
	Sugar beet	Fungicide	1.29	2.5	0.24	1.36	1.36
		Herbicide	4.4	15.15	3.26	9.35	9.35
		Insecticide	1.0	1.0	0.3	1.0	1.0

Country	Crop	Chemical class	Average number of sprays	Average number of active ingredients	Average mass of active substance (kg)	Average number of formulations	Average number of products
		Molluscicide	1.0	1.0	0.12	1.0	1.0
	Wheat	Fungicide	3.27	9.5	1.44	5.59	5.59
		Growth regulator	1.17	1.89	0.91	1.61	1.61
		Herbicide	2.55	5.91	1.5	3.68	3.68
		Insecticide	1.15	1.15	0.02	1.15	1.15
		Molluscicide	1.56	1.56	0.15	1.56	1.56

(a): March 2015 download data
(b): the spray rounds indicate the number of times a tank mix containing PPPs were used on the environmental fields,
(c): where the average number is 1.0 this indicates that it could be an infrequent use and could have been applied to a single field
(c): these data do not include seed treatments

Table 18: Summary of the number of active substances, formulations and products used on each of the environmemental field crop types surveyed for each country in 2013

Country	Crop	Total number of active ingredients	Total number of formulations	Total number number of products
BE	Maize	17	18	25
	Potatoes	42	48	82
	Sugar beet	27	29	50
ES	Beans (with pods)	4	4	4
	Carrots	4	4	4
	Cauliflower	8	7	8
	Celery	5	5	5
	Globe artichokes	7	7	8
	Leek	5	5	5
	Mandarins	10	10	13
	Onions	2	2	2
	Oranges	20	20	26
	Parsnips	1	1	1
	Turnips	3	3	3
	Watermelons	16	16	17
	Wine grapes	25	23	34
GR	Oranges	17	17	20
	Pumpkins	10	10	14
	Sweet corn	6	5	5

Country	Crop	Total number of active ingredients	Total number of formulations	Total number number of products
	Table grapes	14	12	13
	Tomatoes	29	31	46
	Wine grapes	47	50	70
IT	Apples	41	45	89
	Maize	21	20	29
	Tomatoes	37	46	87
	Wine grapes	56	68	110
LT	Potatoes	31	27	29
	Rape seed	26	26	31
	Wheat	49	43	48
NL	Chicory roots	13	13	16
	Lettuce	9	8	8
	Onions	20	19	33
	Potatoes	39	36	40
PL	Apples	41	38	49
	Carrots	22	21	24
	Maize	15	11	13
	Onions	16	15	16
	Wheat	52	55	70
UK	Apples	43	43	73
	Peas (dry)	11	10	10
	Rape seed	47	52	111
	Sugar beet	28	33	59
	Wheat	68	83	139

(a): April 2015 download data

Table 19: Summary of the number of active substances, formulations and products used on each crops surveyed for each country in 2013

Crop type	BE		ES		GR		IT		LT		NL		PL		UK	
	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR
TOTAL	351	446	111	131	253	376	200	361	284	335	180	201	466	521	723	1411
Apples							41	89					42	50	54	96
Apricots					7	6										

Crop type	BE		ES		GR		IT		LT		NL		PL		UK	
	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR
Asparagus															1	1
Aubergines (egg plants)					-	1										
Barley	25	20							48	60			33	34	69	131
Beans (dry)															30	50
Beans (with pods)	12	18	4	4	-	1										
Beetroot									3	2			10	8		
Broccoli															6	6
Carrots	15	21	4	4					6	6	6	5	22	24		
Cauliflower	16	15	8	8											5	9
Celeriac	10	11														
Celery			5	5									9	13		
Cherries													21	27	17	20
Chicory roots											13	18				
Cucumbers													5	4		
Currants (red, black and white)													15	16	21	20
Cut flowers													1	1		
Fennel													2	2		
Garlic													2	2		
Globe artichokes			7	8												
Gooseberries															13	13
Grass	5	5					1	1	2	2	5	4			4	3
Head cabbage	18	17							5	5			20	21	8	8
Hops, dried, including hop pellets unconcentrated															22	27
Leek	20	23	5	5												
Lettuce											10	10				
Linseed															14	16
Maize	18	29			5	5	25	39	8	5	11	9	16	14	5	4
Mandarins			10	13	16	20										
Mustard seed															7	7
Oats	-	1							6	10			3	3	9	8
Oilseeds									2	2			16	13		
Olives for oil production					8	10	3	3								
Onions	20	20	2	2							26	43	24	23	22	25
Oranges			21	27	18	26										
Other cereals	21	12					1	1	31	31			14	9	8	5
Other kind of root and tuber vegetables except sugar beet	10	10							3	3					2	1
Parsley											6	6	17	19		
Parsley root													3	3		
Parsnips			1	1												
Peaches					23	27										
Pears					24	27							23	26	35	53
Peas (dry)									8	8					35	56
Peas (with pods)	11	13									9	9				
Peas (without pods)															11	20

Crop type	BE		ES		GR		IT		LT		NL		PL		UK	
	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR	AI	PR
Peppers					4	6										
Plums													16	16	7	9
Potatoes	44	86			5	5	8	6	36	38	42	45	32	38	45	95
Pumpkins					19	25										
Rape seed									34	49			38	51	77	191
Raspberries															12	11
Rye									7	9			9	7		
Sorghum							1	1								
Soya bean							7	8								
Strawberries	22	22							8	6					1	1
Sugar beet	29	54							9	7	19	20	12	12	53	115
Sunflower seed							3	3								
Sweet corn					6	5										
Table grapes					14	13										
Tomatoes					39	81	38	89								
Turnips			3	3												
Watermelons			16	17	5	5										
Wheat	55	69					16	11	65	85	33	32	61	85	97	368
Wine grapes			25	34	60	113	56	110							7	7
Non crop use									2	6					18	25
Not in list															8	10

(a): AI = active ingredient; PR = product
(b): November 2014 download data

Table 20: The top five active ingredients and formulated mixtures (by area sprayed) for the ERA field presented by country per crop

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
BE	Maize	Herbicide	Terbuthylazine	Herbicide	Nicosulfuron
		Herbicide	Nicosulfuron	Herbicide	Mesotrione [a]/Terbuthylazine
		Herbicide	Mesotrione [a]	Herbicide	S-metolachlor/Terbuthylazine
		Herbicide	Dimethenamid-P	Herbicide	Mesotrione [a]
		Herbicide	Flufenacet	Herbicide	Sulcotrione
	Potatoes	Fungicide	Cymoxanil	Fungicide	Cyazofamid
		Fungicide	Mancozeb	Fungicide	Cymoxanil/Mancozeb
		Fungicide	Cyazofamid	Fungicide	Mandipropamid
		Fungicide	Mandipropamid	Fungicide	Pyraclostrobin/Boscalid
		Fungicide	Propamocarb	Fungicide	Cymoxanil
	Sugar beet	Herbicide	Phenmedipham	Herbicide	Metamitron
		Herbicide	Ethofumesate	Herbicide	Phenmedipham
		Herbicide	Metamitron	Herbicide	Ethofumesate
		Herbicide	Desmedipham	Herbicide	Dimethenamidâ€“p
		Herbicide	Chloridazon	Herbicide	Triflusulfuron-Methyl
ES	Beans (with pods)	Insecticide	Azadirachtin	Insecticide	Azadirachtin
		Insecticide	Pyrethrins	Insecticide	Pyrethrins
		Insecticide	Bacillus thuringiensis var. kurstaki.	Insecticide	Bacillus thuringiensis var. kurstaki.
		Insecticide	Spinosad [d]	Insecticide	Spinosad [d]
	Carrots	Fungicide	Azoxystrobin	Fungicide	Azoxystrobin
		Herbicide	Fluazifop-P-butyl	Herbicide	Fluazifop-P-butyl
		Insecticide	Deltamethrin (cis-deltamethrin)	Insecticide	Deltamethrin (cis-deltamethrin)
		Insecticide	Linuron	Insecticide	Linuron
	Cauliflower	Insecticide	Spirotetramat	Insecticide	Spirotetramat
		Insecticide	Cypermethrin-Alpha	Insecticide	Cypermethrin-Alpha
		Insecticide	Lambda-Cyhalothrin	Insecticide	Lambda-Cyhalothrin
		Insecticide	Indoxacarb [b]	Insecticide	Indoxacarb [b]

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
		Acaricide/insecticide	Cypermethrin	Acaricide/insecticide	Cypermethrin
	Celery	Fungicide	Chlorothalonil	Fungicide	Chlorothalonil
		Fungicide	Azoxystrobin	Fungicide	Azoxystrobin
		Insecticide	Lambda-Cyhalothrin	Insecticide	Lambda-Cyhalothrin
		Insecticide	Pirimicarb	Insecticide	Pirimicarb
		Insecticide	Indoxacarb [b]	Insecticide	Indoxacarb [b]
	Globe artichokes	Insecticide	Cypermethrin-Alpha	Insecticide	Cypermethrin-Alpha
		Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
		Insecticide	Indoxacarb [b]	Insecticide	Indoxacarb [b]
		Insecticide	Azadirachtin	Insecticide	Azadirachtin
		Insecticide	Pyrethrins	Insecticide	Pyrethrins
	Leek	Insecticide	Deltamethrin (cis-deltamethrin)	Insecticide	Deltamethrin (cis-deltamethrin)
		Fungicide	Captan	Fungicide	Captan
		Fungicide	Azoxystrobin	Fungicide	Azoxystrobin
		Insecticide	Cypermethrin	Insecticide	Cypermethrin
		Insecticide	Cypermethrin-Alpha	Insecticide	Cypermethrin-Alpha
	Mandarins	Insecticide	Paraffin oil	Insecticide	Paraffin oil
		Herbicide	Glyphosate	Herbicide	Glyphosate
		Acaricide	Hexythiazox	Acaricide	Hexythiazox
		Acaricide/insecticide	Abamectin	Acaricide/insecticide	Abamectin
		Insecticide	Pyriproxyfen	Insecticide	Pyriproxyfen
	Onions	Insecticide	Azadirachtin	Insecticide	Azadirachtin
		Insecticide	Pyrethrins	Insecticide	Pyrethrins
	Oranges	Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
		Herbicide	Glyphosate	Herbicide	Glyphosate
		Insecticide	Pyriproxyfen	Insecticide	Pyriproxyfen
		Herbicide	Oxyfluorfen	Herbicide	Oxyfluorfen
		Insecticide	Paraffin oil	Insecticide	Paraffin oil

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
	Parsnips	Herbicide	Fluazifop-P-butyl	Herbicide	Fluazifop-P-butyl
	Turnips	Insecticide	Bacillus thuringiensis var. kurstaki.	Insecticide	Bacillus thuringiensis var. kurstaki.
		Insecticide	Azadirachtin	Insecticide	Azadirachtin
		Insecticide	Pirimicarb	Insecticide	Pirimicarb
	Watermelons	Fungicide	Sulfur (S)	Fungicide	Sulfur (S)
		Fungicide	Copper oxychloride	Fungicide	Copper oxychloride
		Fungicide	Mancozeb	Fungicide	Mancozeb
		Fungicide	Hexythiazox	Fungicide	Hexythiazox
		Insecticide	Imidacloprid	Insecticide	Imidacloprid
	Wine grapes	Insecticide	Bacillus thuringiensis var. kurstaki.	Insecticide	Bacillus thuringiensis var. kurstaki.
		Fungicide	Sulfur (S)	Fungicide	Sulfur (S)
		Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
		Fungicide	Mancozeb	Fungicide	Copper oxychloride
		Fungicide	Copper oxychloride	Fungicide	Mancozeb
GR	Oranges	Insecticide	Paraffin oil	Insecticide	Paraffin oil
		Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
		Herbicide	Glyphosate	Insecticide	Deltamethrin (cis-deltamethrin)
		Insecticide	Deltamethrin (cis-deltamethrin)	Herbicide	Glyphosate
		Fungicide	Tribasic copper sulfate	Fungicide	Tribasic copper sulfate
	Pumpkins	Fungicide	Penconazole	Fungicide	Penconazole
		Fungicide	Myclobutanil	Fungicide	Myclobutanil
		Fungicide	Azoxystrobin	Fungicide	Azoxystrobin
		Fungicide	Copper and derivatives	Fungicide	Copper and derivatives
		Fungicide	Fosetyl-aluminium	Fungicide	Fosetyl-aluminium
	Sweet corn	Insecticide	Deltamethrin (cis-deltamethrin)	Insecticide	Deltamethrin (cis-deltamethrin)
		Herbicide	Terbuthylazine	Herbicide	S-metolachlor/terbuthylazine
		Herbicide	S-metolachlor	Insecticide	Alpha-cypermethrin

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
		Insecticide	Alpha-cypermethrin	Herbicide	Acetochlor/Terbuthylazine
		Herbicide	Acetochlor	Insecticide	Indoxacarb [b]
	Table grapes	Fungicide	Mancozeb	Fungicide	Pyraclostrobin/Dimethomorph
		Fungicide	Pyraclostrobin	Fungicide	Mancozeb
		Fungicide	Dimethomorph	Fungicide	Myclobutanil
		Fungicide	Myclobutanil	Fungicide	Copper oxychloride/Mancozeb
		Fungicide	Copper oxychloride	Fungicide	Sulphur
	Tomatoes	Fungicide	Mancozeb	Insecticide	Indoxacarb [b]
		Fungicide	Cymoxanil	Fungicide	Mancozeb
		Insecticide	Indoxacarb [b]	Fungicide	Fosetyl-aluminium
		Fungicide	Fosetyl-aluminium	Fungicide	Cymoxanil/Famoxadone
		Fungicide	Famoxadone	Herbicide	Metribuzin
	Wine grapes	Fungicide	Sulphur	Fungicide	Sulphur
		Fungicide	Mancozeb	Fungicide	Folpet
		Fungicide	Folpet	Insecticide	Chlorpyrifos
		Fungicide	Cymoxanil	Fungicide	Quinoxyfen
		Insecticide	Chlorpyrifos	Fungicide	Copper hydroxide
IT	Apples	Fungicide	Dithianon	Fungicide	Dithianon
		Fungicide	Captan	Fungicide	Captan
		Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
		Fungicide	Sulfur (S)	Fungicide	Sulfur (S)
		Fungicide	Difenoconazole	Fungicide	Difenoconazole
	Maize	Herbicide	Terbuthylazine	Insecticide	Tefluthrin
		Insecticide	Tefluthrin	Herbicide	Dicamba
		Herbicide	Dicamba	Herbicide	S-metolachlor/Terbuthylazine/Mesotrione [a]
		Herbicide	Nicosulfuron	Herbicide	Nicosulfuron
		Insecticide	Lambda-Cyhalothrin	Herbicide	Isoxaflutole [c]
	Tomatoes	Fungicide	Copper and derivatives	Fungicide	Copper and derivatives

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
		Herbicide	Metribuzin	Herbicide	Metribuzin
		Fungicide	Copper oxychloride	Fungicide	Copper oxychloride/Metalaxyl-M
		Fungicide	Metalaxyl-M	Herbicide	Pendimethalin
		Herbicide	Pendimethalin	Herbicide	Oxadiazon
	Wine grapes	Fungicide	Sulfur (S)	Fungicide	Sulfur (S)
		Fungicide	Copper and derivatives	Fungicide	Copper and derivatives
		Fungicide	Metiram	Fungicide	Metiram
		Fungicide	Dimethomorph	Fungicide	Spiroxamine
		Fungicide	Mandipropamid	Fungicide	Dimethomorph
LT	Potatoes	Fungicide	Dimethomorph	Fungicide	Dimethomorph/Ametoctradin
		Fungicide	Ametoctradin	Insecticide	Alpha-cypermethrin
		Insecticide	Alpha-cypermethrin	Herbicide	Aclonifen
		Fungicide	Mancozeb	Fungicide	Fluopicolide/Propamocarb hydrochloride
		Fungicide	Propamocarb hydrochloride	Insecticide	Thiametoxam
	Rape seed	Herbicide	Metazachlor	Herbicide	Metazachlor
		Insecticide	Deltamethrin (cis-deltamethrin)	Insecticide	Alpha-cypermethrin
		Insecticide	Alpha-cypermethrin	Insecticide	Thiacloprid/Deltamethrin
		Fungicide	Tebuconazole	Insecticide	Zeta-Cypermethrin
		Insecticide	Thiacloprid	Fungicide	Tebuconazole
	Wheat	Fungicide	Tebuconazole	Growth regulator	Chlormequat chloride
		Growth regulator	Chlormequat chloride	Fungicide	Tebuconazole
		Herbicide	Glyphosate	Herbicide	Glyphosate
		Herbicide	Dicamba	Insecticide	Thiacloprid/Deltamethrin
		Fungicide	Epoxiconazole	Herbicide	Dicamba/Tritosulfuron
NL	Chicory roots	Herbicide	Carbetamide	Herbicide	Carbetamide
		Herbicide	Chlorpropham	Herbicide	Chlorpropham
		Herbicide	S-metolachlor	Herbicide	S-metolachlor
		Herbicide	Propyzamide	Herbicide	Propyzamide
		Insecticide	Thiacloprid	Insecticide	Thiacloprid

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
	Lettuce	Fungicide	Mancozeb	Insecticide	Deltamethrin
		Insecticide	Deltamethrin (cis-deltamethrin)	Fungicide	Mancozeb/Dimethomorph
		Fungicide	Dimethomorph	Fungicide	Mancozeb/Metalaxyl-M
		Fungicide	Metalaxyl-M	Fungicide	Fluopyram
		Fungicide	Fluopyram	Insecticide	Spirotetramat
	Onions	Fungicide	Mancozeb	Fungicide	Mancozeb
		Herbicide	Chlorpropham	Herbicide	Chlorpropham
		Herbicide	Chloridazon	Herbicide	Chloridazon
		Herbicide	Pendimethalin	Herbicide	Pendimethalin
		Herbicide	S-metolachlor	Herbicide	S-metolachlor
	Potatoes	Fungicide	Mancozeb	Fungicide	Cyazofamid
		Fungicide	Cyazofamid	Fungicide	Fluopicolide/Propamocarb
		Fungicide	Fluopicolide	Fungicide	Cymoxanil/Mancozeb
		Fungicide	Propamocarb	Fungicide	Mandipropamid
		Fungicide	Cymoxanil	Insecticide	Esfenvalerate
PL	Apples	Fungicide	Dithianon	Fungicide	Dithianon
	Apples	Fungicide	Captan	Fungicide	Captan
		Fungicide	Copper oxychloride	Fungicide	Copper oxychloride
		Herbicide	Glyphosate	Herbicide	Glyphosate
		Herbicide	MCPA	Fungicide	Difenoconazole
	Carrots	Herbicide	Linuron	Herbicide	Linuron
		Fungicide	Trifloxystrobin	Herbicide	Flurochloridone
		Herbicide	Flurochloridone	Fungicide	Trifloxystrobin
		Fungicide	Azoxystrobin	Fungicide	Boscalid/Pyraclostrobin
		Insecticide	Chlorpyrifos	Insecticide	Chlorpyrifos
	Maize	Herbicide	Nicosulfuron	Herbicide	Nicosulfuron
		Herbicide	Mesotrione [a]	Herbicide	Mesotrione [a]/Metholachlor/Terbuthylazine
		Herbicide	Metholachlor	Herbicide	Acetochlor

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
		Herbicide	Terbuthylazine	Herbicide	Sulcotrione
		Herbicide	Acetochlor		
	Onions	Herbicide	Oxyfluorfen	Herbicide	Oxyfluorfen
		Fungicide	Azoxystrobin	Herbicide	Clopyralid
		Herbicide	Clopyralid	Fungicide	Chlorothalonil/Azoxystrobin
		Fungicide	Chlorothalonil	Insecticide	Cypermethrin
		Fungicide	Cymoxanil	Herbicide	Pendimethalin
	Wheat	Fungicide	Epoxiconazole	Growth regulator	Trinexapac-Ethyl
		Fungicide	Prothioconazole	Growth regulator	Chlormequat chloride
		Growth regulator	Trinexapac-Ethyl	Fungicide	Fluoxastrobin/Prothioconazole
		Fungicide	Fenpropimorph	Fungicide	Fenpropimorph/Epoxiconazole/Metrafenone
		Growth regulator	Chlormequat chloride	Fungicide	Tebuconazole
UK	Apples	Fungicide	Captan	Fungicide	Captan
		Fungicide	Myclobutanil	Fungicide	Myclobutanil
		Fungicide	Penconazole	Fungicide	Penconazole
		Fungicide	Dithianon	Fungicide	Dithianon
		Fungicide	Copper oxychloride	Fungicide	Copper oxychloride
	Rape seed	Fungicide	Prothioconazole	Molluscicide	Metaldehyde
		Molluscicide	Metaldehyde	Herbicide	Glyphosate
		Fungicide	Flusilazole	Insecticide	Lambda-Cyhalothrin
		Fungicide	Tebuconazole	Insecticide	Cypermethrin
		Herbicide	Glyphosate	Fungicide	Fludioxonil/Thiametoxam/Metalaxyl-M
	Sugar beet	Herbicide	Phenmedipham	Herbicide	Metamitron
		Herbicide	Ethofumesate	Herbicide	Desmedipham/Lenacil/Ethofumesate/ Phenmedipham
		Herbicide	Desmedipham	Herbicide	Triflusulfuron-methyl
		Herbicide	Lenacil	Herbicide	Desmedipham/Phenmedipham
		Herbicide	Metamitron	Fungicide	Trifloxystrobin/Cyproconazole

Country	Crop	Active ingredient chemical class	Active ingredient	Formulated mixture chemical class	Formulated mixtures
	Wheat	Fungicide	Prothioconazole	Growth regulator	Chlormequat
		Fungicide	Tebuconazole	Fungicide	Chlorothalonil
		Fungicide	Epoxiconazole	Fungicide	Tebuconazole/Prothioconazole
		Fungicide	Chlorothalonil	Molluscicide	Metaldehyde
		Growth regulator	Chlormequat	Herbicide	Fluroxypyr

(a): Sum of mesotrione and MNBA (4-methylsulfonyl-2-nitro benzoic acid), expressed as mesotrione
(b): Sum of the isomers S and R
(c): Sum of isoxaflutole, RPA 202248 and RPA 203328, expressed as isoxaflutole
(d): Sum of Spinosyn A and Spinosyn D, expressed as Spinosad
(e): March 2015 download data

Table 21 provides information on the number of fields insecticidal formulations were applied and the average number of applications those fields received, for a Northern (Lithuania), Southern (Greece) and Central (United Kingdom) regulatory zone country.

Table 21: Number of fields insecticides were applied and the average number of applications those fields received for Lithuania, Greece and the United Kingdom in 2013

Country	Crop	Active ingredients	Number of fields	Average number of applications
GR	Oranges	Abamectin	2	1.0
		Chlorpyrifos	7	1.6
		Deltamethrin (cis-deltamethrin)	5	1.2
		Dimethoate	3	1.0
		Imidacloprid	1	1.0
		paraffin oil	5	2.4
		Phosmet	3	1.0
		Pyriproxyfen	1	1.0
		Spirotetramat	3	1.0
		Tau-fluvalinate	1	1.0
	Pumpkins	Deltamethrin (cis-deltamethrin)	13	1.3
		Thiametoxam	1	1.0
	Sweet corn	Alpha-cypermethrin	2	1.0
		Deltamethrin (cis-deltamethrin)	5	2.0
		Indoxacarb as sum of the isomers S and R	1	1.0
	Tomatoes	Abamectin	5	1.0
		Abamectin (sum of Avermectin B1a, AvermectinB1b and delta-8,9 isomer of Avermectin B1a)	5	1.4
		Acetamiprid	1	1.0
		Chlorantranilipole	3	1.3
		Emamectin benzoate B1a, expressed as emamectin	7	1.4
		Imidacloprid	11	1.1
		Indoxacarb as sum of the isomers S and R	15	1.7
		Pymetrozine	6	1.5
	Wine grapes	Beta-cyfluthrin	2	1.0
		Chlorantranilipole	3	1.0
		Chlorantraniliprole	7	1.1
		Chlorpyrifos	10	2.5
		Chlorpyrifos-methyl	10	2.1
		Cypermethrin	1	1.0
		Deltamethrin (cis-deltamethrin)	6	1.2
		Lambda-Cyhalothrin	2	1.0
		Methoxyfenozide	1	1.0

Country	Crop	Active ingredients	Number of fields	Average number of applications
		Spirotetramat	4	1.0
		Tebufenozide	7	1.6
LT	Potatoes	Acetamiprid	2	1.0
		Alpha-cypermethrin	6	1.7
		Deltamethrin (cis-deltamethrin)	1	1.0
		Lambda-Cyhalothrin	1	1.0
		Thiacloprid/Deltamethrin	6	1.3
		Thiametoxam	8	1.6
	Rape seed	Alpha-cypermethrin	5	1.2
		Beta-cyfluthrin	2	1.0
		Cypermethrin	3	1.0
		Deltamethrin (cis-deltamethrin)	1	1.0
		Indoxacarb as sum of the isomers S and R	4	1.0
		Lambda-Cyhalothrin	1	1.0
		Lambda-Cyhalothrin/Thiametoxam	1	1.0
		Pymetrozine	5	1.0
		Thiacloprid/Deltamethrin	8	1.3
		Zeta-Cypermethrin	3	1.3
	Wheat	Alpha-cypermethrin	3	1.0
		Beta-cyfluthrin	1	1.0
		Lambda-Cyhalothrin/Thiametoxam	1	1.0
		Thiacloprid/Deltamethrin	3	1.0
UK	Apples	Chlorantranilipole	12	1.2
		Chlorpyrifos	15	2.1
		Cypermethrin	3	4.0
		Flonicamid	9	1.3
		Indoxacarb as sum of the isomers S and R	3	1.0
		Methoxyfenozide	4	1.3
		Pyrethrins	1	1.0
		Thiacloprid	11	1.1
	Peas (dry)	Esfenvalerate	1	1.0
		Lambda-Cyhalothrin	1	1.0
	Rape seed	Cypermethrin	10	1.5
		Indoxacarb as sum of the isomers S and R	2	1.0
		Lambda-Cyhalothrin	10	1.5
		Pirimicarb	1	1.0

Country	Crop	Active ingredients	Number of fields	Average number of applications
		Tau-fluvalinate	6	1.0
		Zeta-Cypermethrin	1	1.0
		Lambda-Cyhalothrin	1	1.0
		Oxamyl	1	1.0
	Wheat	Alpha-cypermethrin	1	1.0
		Cypermethrin	6	1.0
		Lambda-Cyhalothrin	6	1.2
		Zeta-Cypermethrin	1	1.0

(a): March 2015 download data

Table 22provides information on the area (ha) treated per country per farm and per country per field per farm. These data include repeat applications to the crops but do take into account tank mixing of a number of products within a spray round (entry into a field). Using the database it is possible, by using the '**sp_rnd number**', to calculate the actual or average number of entries made to a field. This is especially so for the environmental field, which is a single field with a full spray programme.

Table 22: Overview of the treated area per country per farm and per country per field

Country	Number of farms	Area treated per farm (ha)				Number of fields	Area treated per field (ha)			
		AM	SD	Min	Max		AM	SD	Min	Max
BE	29	660.3	670.5	128.0	3476.0	211	90.7	174.7	<0.1	1981.0
ES	57	10.3	14.3	0.4	95.0	74	7.9	11.2	0.1	75.0
GR	68	111.7	138.8	1.5	721.5	571	13.3	22.4	0.1	195.0
IT	77	647.1	923.6	14.4	6640.0	117	425.8	718.5	3.6	5880.0
LT	31	484.5	524.2	6.9	2020.0	198	75.9	103.0	<0.1	522.3
NL	15	652.5	751.0	16.0	2790.0	77	127.1	321.0	<0.1	2790.0
PL	61	651.4	1989.9	1.0	14402.0	326	121.9	379.5	0.2	3500.0
UK	45	2824.5	3492.2	161.7	14855.2	2021	62.9	90.2	<0.1	924.1

(a): AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

3.2.2. Details of the sprayers used on farms

Whilst most of the farms surveyed had one sprayer, 40% of the farms surveyed had two sprayers, 11% had three sprayers and 3.6% had four sprayers, whilst one farm in Italy had eight sprayers. Table 23 providers details of the main and auxiliary tanks capacities of the sprayers present on the farms surveyed, whilst Table 24 provides details of the boom width and age of sprayers. Across all eight countries, on average, a sprayer has a main tanks capacity of 1468.5 L, an auxiliary tank capacity of 108.6 L, a boom width of 11.6 m and is 9.4 years old. Table 25 provides an overview of the cab types observed during the survey. Operators in ES and GR generally have sprayers with no cab whilst those for other countries have closed cabs, with those for IT and UK mostly have carbon filters.

Table 23: A summary of the sprayer main and auxiliary tank capacities per county

Country	Main tank capacity of sprayers (L)						Auxiliary tank capacity of sprayers (L)					
	N	AM	SD	Median	Min	Max	N	AM	SD	Median	Min	Max
BE	37	2148.7	1258.8	2000	750	4100	37	267.8	228.9	200	0	1200
ES	78	997.0	798.6	1000	15	3000	78	0.0	0.0	0	0	0
GR	114	1038.5	820.0	1000	0	3200	115	74.5	269.1	0	0	2000
IT	103	1617.0	994.8	1300	300	4500	103	75.9	124.5	30	0	900
LT	31	1874.2	1425.5	1200	200	5200	31	194.5	154.2	120	20	600
NL	58	1696.4	1798.0	850	1	5900	58	136.4	187.9	25	0	700
PL	87	1244.5	1336.1	1000	10	8000	87	57.5	118.4	0	0	500
UK	130	1132.0	1306.5	1000	0	6200	132	62.2	117.4	0	0	600

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

Table 24: A summary of the sprayer boom width and height per county

Country	**Boom width (m)**						**Age of sprayer (years)**					
	N	**AM**	**SD**	**Median**	**Min**	**Max**	**N**	**AM**	**SD**	**Median**	**Min**	**Max**
BE	37	25.5	6.0	27	18	36	36	11.75	8.16	12	0	30
ES	2	1.0	0	1	1	1	78	4.26	1.46	4	2	9
GR	53	3.6	4.4	1.5	0.8	16	84	10.85	7.02	10	2	30
IT	95	9.9	9.2	10	1.2	31	103	6.42	4.6	5	1	20
LT	31	16.6	5.2	16	6	24	31	7.39	6.44	5	0	22
NL	53	20.2	15.9	21	0	48	53	10.92	7.59	10	1	30
PL	53	3.6	4.4	1.5	0.8	16	87	12.89	7.95	12	1	35
UK	88	12.7	12.3	12	0	36	121	10.86	10.89	6	0	55

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 dwonload data

Table 25: Summary of the number of sprayer cab types in different countries (percentages in parenthesis)

Cab type	**Code**	**BE**	**ES**	**GR**	**IT**	**LT**	**NL**	**PL**	**UK**
No cab	NO	-	77(98.7)	78(66.1)	2(1.9)	-	24(41.4)	1(1.1)	35(26.5)
Open cab	OP	3(8.1)	1(1.3)	12(10.2)	16(15.5)	-	3(5.2)	5(5.7)	7(5.3)
Closed cab	CL	28(75.7)	-	16(13.6)	9(8.7)	26(83.9)	19(32.8)	60(69.0)	6(4.5)
Cab with no filter	CA	-	-	1(0.8)	2(1.9)	1(3.2)	-	9(10.3)	2(1.5)
Carbon filter	CF	6(16.2)	-	11(9.3)	74(71.8)	4(12.9)	12(20.7)	12(13.8)	82(62.1)
TOTAL		37	78	118	103	31	58	87	132

(a): November 2014 download data

3.3. Assessment of the collated data with regard to operator exposure

One of the main aims of this study was to collate information regarding the spraying and other worker activities of farm principal operators on over 400 farms spread across the Northern, Central and Southern regulatory zones. The following tables outline the statistical analysis of farm principal operator information from the survey year 2013. This analysis was produced on the survey data available on the 12th of November 2014. Whilst significant data cleansing and error checking had been undertaken prior to this date a number of corrections were made to the data within the database after this date. Because the volume of data collected in this study is so great there are still opportunities for refinement and modification of the data.

Data were only collected on the principal spray operator on 95% of the farms surveyed the remaining farms had information collected on 2 or more operators, up to a maximum of 4. Most of the additional operators (i.e. not the principal operator) were recorded because of their input on the environmental field. Table 26 provides a summary of the age and years spraying experience of the principal operators. The average age of spray operators across all countries was 47 years and the average amount of spraying experience was 23 years. This age is less than studies conducted in the UK in 2001 where the average age was between 50 and 55 years. The majority (99.5%) of spray operators were male with only two female spray operators identified with only one of those being a principal spray operator.

Table 26: Principal operators age (years), spraying experience (years) and whether they hold a nationally recognised spray certificate, on a per country basis

Country	Age (years)						Spraying experience (years)						Spray certificate	
	N	AM	SD	Median	Min	Max	N	AM	SD	Median	Min	Max	No	Yes
BE	35	48.0	10.2	48	23	74	36	24.9	13.9	26.5	1	60	21	15
ES	66	49.3	9.1	49.5	27	65	66	19.0	8.7	20	2	35	0	66
GR	73	48.0	10.3	48	28	75	71	24.8	12.2	25	0	60	73	0
IT	89	46.5	10.6	46	29	77	89	28.2	10.9	27	10	60	0	89
LT	31	46.3	8.6	44	29	65	31	16.2	7.6	15	5	40	0	31
NL	28	50.2	9.7	52.5	30	64	25	27.8	9.9	30	5	40	0	28
PL	64	44.8	9.2	45.5	27	61	63	19.3	8.4	20	1	40	2	62
UK	50	47.7	11.6	50.5	20	69	45	25.2	13.5	25	1	54	4	47

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum,
(b): November 2014 download data

When principal operators average daily spraying hours are considered, consistencies across countries are observed, they only vary from 2.1 hours to 4.2 hours, despite there being a range of almost 70 crops across 7 countries (unfortunately no information on the hours spent spraying was available from Italy) (Table 27). ST (Seed treatments) have been excluded from most tables as the times relate more to seed drilling rates rather than spray applications. SD (Seed drum) applications have also been excluded as this is more an application in-situ rather than a field applied process. Molluscicides incorporated (MI) and Molluscicides broadcast (MB) have also both been excluded as the former is normally applied at the time of seed drilling and the latter can often be used at the same time as the sprayer and may therefore double-up the number of hours spent spraying.

The maximum daily hours spent spraying by an operator varied between 8 and 17.5 hours. However, for those growing arable crops, BE, LT, PL and UK the maximum varied between 13.8 and 17.5 hours. Default or unknown values were recorded as 99 and have been excluded.

Table 27: Overview of number of application days and application duration per country (excluding application methods ST, SD, MB, MI and VC)

Country	Number of farms	Number of application days	Summary of hours spraying (per day)					Number of applications per farm		Average application time per farm (h)		Minimal application time per farm (h)		Maximal application time per farm (h)	
			N	AM	SD	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
BE	27	736	734	4.0	3.0	0.15	17.3	7	73	1.2	8.1	0.15	3.25	2.5	17.3
ES	57	174	174	3.1	2.2	0.50	11	1	10	0.5	11.0	0.50	11.00	0.5	11.0
GR	59	922	920	3.1	2.5	0	16.9	1	40	0.5	9.5	<0.1	7.00	0.5	16.9
IT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LT	31	408	402	3.3	2.8	0.08	13.8	2	27	0.6	7.4	0.08	3.25	1.0	13.8
NL	5	114	114	2.1	1.4	0.50	8	7	35	0.7	2.8	0.50	1.00	1.0	8.0
PL	57	1139	1138	3.9	3.2	0.03	17.5	2	52	0.2	9.5	0.03	8.00	0.9	17.5
UK	44	1996	1864	4.1	3.2	0.13	16	8	88	1.2	10.2	0.13	3.48	3.9	16.0

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 dwonload data

Table 28 shows the main methods of application used in the survey on an overall and per country basis. A full list of the method of application codes is available in section 2.1.1.2. Some methods of application, for example AA (Air assisted), have been removed as they duplicated other codes, in this example BA (Broadcast air assisted). It can be clearly seen that Hydraulic boom sprayers (HD) were the most regularly used sprayer and Appendix I provides details of the range of crops that they were used on. The range of uses of Hydraulic boom sprayers is extremely variable, including applications to field grown arable and vegetable crops to herbicide strip applications made to row crops such as grapevines, blackcurrants, apples and citrus.

Table 28: Overview of application duration (in h) total and per country per application method (excluding application methods ST, SD, MB, MI, VC)

App. method	Total					BE		ES		GR		LT		NL		PL		UK	
	N	AM	SD	Min	Max	N	AM	N	AM	N	AM	N	AM	N	AM	N	AM	N	AM
AA	54	5.7	2.7	0.8	12													54	5.7
BA	2145	3.7	2.8	0	15.4					663	3.0					594	3.8	888	4.2
DR	1	0.5	.	0.5	0.5	1	0.5												
DU	14	2.9	2.1	0	8			7	2.9	7	2.9								
FO	3	1.0	0.0	1	1									3	1.0				
GA	13	1.1	0.9	0.5	4											13	1.1		
GB	1	8.0	.	8	8	1	8.0												
GI	1	1.0	.	1	1									1	1.0				
GS	3	10.0	1.0	9	11													3	10.0
GU	54	5.9	3.2	1.5	16.9					54	5.9								
HA	160	3.0	2.0	0.1	8.5	28	3.9	45	3.7									87	2.4
HD	3527	2.9	2.7	0	17.5	764	3.7	19	2.1	216	2.4	469	2.8	119	2.0	604	3.2	1336	2.5
HM	2	3.8	3.2	1.5	6			2	3.8										
KN	36	2.7	2.1	0.5	8	3	6.3	10	2.7	7	2.8	1	0.5					15	2.2
LA	21	3.7	2.4	0.3	10					15	3.6							6	4.1
MF	104	2.0	2.1	0.3	8											104	2.0		
MI	2	8.5	9.9	1.4	15.5													2	8.5
MK	5	3.1	2.7	0.5	6	1	0.5	4	3.8										
RA	79	3.0	2.6	0.5	11			79	3.0										
SB	8	1.9	2.5	0.5	8			4	1.0	3	1.1							1	8.0
TA	2	4.5	0.7	4	5			2	4.5										
TH	2	5.5	0.7	5	6			2	5.5										
VB	6	5.4	3.2	0.3	9													6	5.4

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

An examination of the exposure of the principal operator to individual active substances throughout the 2013 cropping year was performed. On average principal operators are exposed to active substances for between 2.2 – 3.9 hours, the degree of the exposure per active substance is consistent across the eight countries (Table 29). However the number of individual active substances the principal operator can be exposed to varies drastically across the eight countries (considering Form 3 data only)(Figure 13). In GR, LT, NL and PL principal operators are exposure to on average between 14 - 18 active ingredients, whilst for BE and UK this can be on average 37 active ingredients and upto 71 (UK). Principal operators in ES are exposed to the fewest number of active ingredients, only four on average. Where two active substances are present in a formulated product they have been separated and would be cumulative to the total number of active substances present. Principal operators in each country spend between 1.1 – 3.2 h per spray round (Table 30), however it must be noted that some of the high values, such as the 19 h in the PL, can include amalgamated fields which can represent a significant area of crop and are likely to represent a full days work.

Table 29: Principal operators daily duration of exposure (h) per farm per active substance used per country

Country	AM	SD	Min	Max
BE	3.8	2.8	0.02	17
ES	2.8	2.1	0.5	11
GR	3.0	2.4	0	30
IT	-	-	-	-
LT	2.9	2.5	0.1	13.8
NL	2.2	1.5	0.5	8
PL	3.9	3.5	0.03	30
UK	3.5	3.3	0	80.4

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

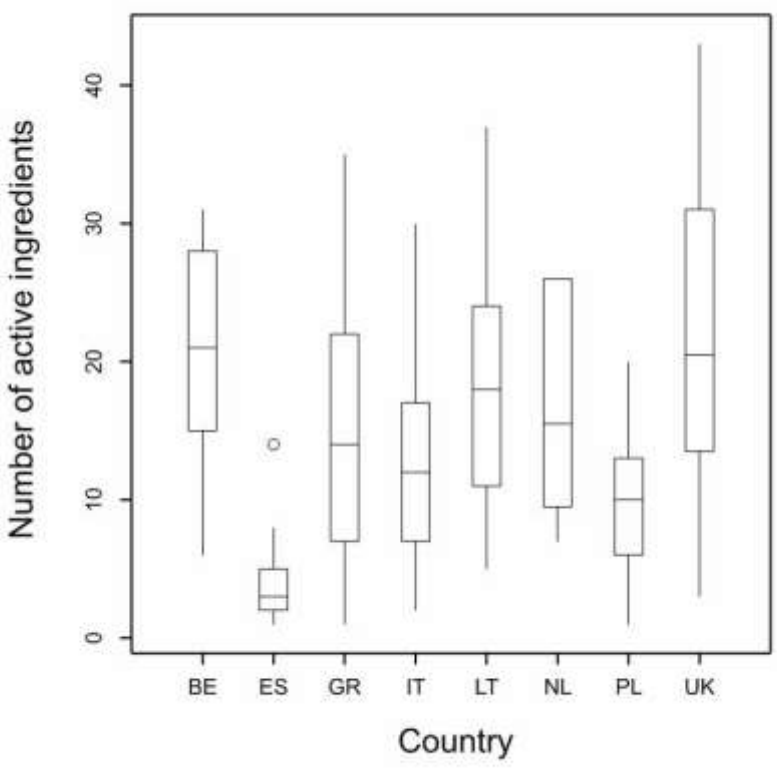

Figure 13. Number of active substances applied per principal operator on each farm per country in 2013

Table 30: Duration (h) spent by a principal operator spraying per spray round on each farm per country in 2013

Country	AM	SD	Min	Max
BE	2.4	2.3	0	17
ES	3.1	2.2	0.5	11
GR	1.6	1.5	0	8.5
IT	-	-	-	-
LT	2.6	2.3	0.1	11
NL	1.4	0.9	0.4	6.5
PL	3.2	3.0	0	19
UK	1.1	1.4	0	12

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

Spray round is the term used to describe the entry into a crop or field by a sprayer. It refers to the constituents of a spray tank and can include single products or a group of products. Where multiple products are used in a single sprayer tank the spray round number is the same for all. It therefore acts

as a linking number for the contents of a tank mix. Spray round can be used to calculate the number of sprayer entries into a field.

When considering non-dietary exposure of the operators, cleaning the sprayer, and mixing and loading the sprayer are two operations/activities that bring the operator closer to the pesticide products than would be experienced when in a spray cab, particularly one that was air conditioned and filtered.

As with many other questions posed in this study, there are many similarities between countries which can be used in future exposure models. For example the average time spent cleaning the sprayer is approximately 0.43 hours. However, the number of times the sprayer is cleaned each year is much more variable but with 10 times being a common maximum (particularly for arable or fruit crops) (Table 31).

For mixing and loading the sprayer there were similarities between the countries with an average of 0.25 hours spent performing this activity with a range of between 0.17 and 0.5 hours (Table 32). On average mixing and loading took place 3 times a day with a range from one to five times a day. Again this will vary depending on the range of crops being surveyed.

Table 31: A summary of the sprayer cleaning activities

Country	Time spent cleaning the sprayer (h)						Sprayer cleaning events per year					
	N	AM	SD	Median	Min	Max	N	AM	SD	Median	Min	Max
BE	38	0.7	0.4	0.625	0.17	2	38	17.6	29.7	10	1	180
ES	81	0.4	0.1	0.5	0.25	0.5	81	18.8	21.2	8	1	90
GR	88	0.3	0.3	0.25	0	1	55	12.4	13.1	10	0	50
IT	106	0.5	0.3	0.5	0.08	1	106	9.6	13.3	1	1	56
LT	31	0.9	0.6	0.5	0.25	2	31	1.8	0.6	2	1	4
NL	55	0.9	1.6	0.25	0	10	53	3.4	6.0	1	0	41
PL	61	1.1	2.3	0.33	0	16	61	11.0	9.4	10	0	30
UK	119	0.7	1.1	0.5	0	9	113	4.2	6.7	2	0	50

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

Table 32: A summary of the mixing and loading activities

Country	Time spent mixing and loading (h)						Mixing and loading events per day					
	N	AM	SD	Median	Min	Max	N	AM	SD	Median	Min	Max
BE	38	0.2	0.1	0.25	0.017	0.33	38	3.3	1.6	3	1	10
ES	81	0.5	0.1	0.5	0.25	0.5	81	1.9	2.3	1	1	20
GR	90	0.2	0.1	0.17	0.03	1	79	4.0	2.4	4	1	15
IT	106	0.2	0.1	0.16	0.08	1	106	4.5	3.2	4	1	20
LT	31	0.3	0.1	0.33	0.17	0.5	31	3.4	1.6	4	1	7
NL	55	0.2	0.2	0.14	0.01	1	55	2.7	2.4	2	0	15
PL	62	0.4	0.2	0.3	0.05	1	62	3.5	2.2	3	1	14
UK	128	0.2	0.1	0.25	0.017	0.66	122	4.7	3.2	4.75	1	24

(a): N = number, AM = average mean, SD = standard deviation, Min = minimum, Max = maximum
(b): November 2014 download data

During the survey detailed information on the usage of PPE when performing pesticide application, mixing and loading, sprayer cleaning and other work activities have been collected and a summary of these data are provided in Table 33. The use of gloves, coveralls and face shields are similar when operators are mixing and filling solids and liquids but the use of respiratory protective equipment (RPE) is higher when mixing and filling solids. Table 34 provides information on the number of principal spray operators that wear specific PPE on a per country per method of application basis.

Table 33: A summary of the numbers of PPE worn by principal operators in all countries when performing mixing and loading, pesticide application and sprayer cleaning activities (percentages in parentheses)

Type of Activity	Total number of principal operators	Gloves	Type 3, 4 or 6 coveralls	RPE	Face Shield
Mixing & loading (liquids)	427	385 (90.2)	136 (31.9)	231 (54.1)	46 (10.8)
Mixing & loading (solids)	369	333 (90.2)	125 (33.9)	259 (70.2)	30 (8.1)
Pesticide application	419	210 (50.1)	93 (22.2)	184 (20.8)	10 (2.4)
Cleaning the sprayer	404	324 (80.2)	99 (24.5) [a]	87 (21.5)	23 (5.7)

(a): When waterproofs are included this figure increases to 189 (46.8)
(b): March 2015 download data

Table 34: The number of principal spray operators that wear specific PPE on a per country per method of application basis

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
BE	Hydraulic boom (downward)	Coat - padded	1
		Full length trousers	1
		Gloves - Fabric/leather	1
		Gloves - Latex	2
		Gloves - Neoprene	1
		Gloves - Nitrile	1
		Gloves - Vinyl	3
		Leather/fabric boots	21
		Long sleeved shirt	1
		Respirator - Disposable filtering half mask	2
		Respirator - Full face mask	1
		Respirator - Half mask, reusable with filters	3
		Respirator - Valved filtering half mask	1
		Rubber boots	15
		Work wear: breathable	31

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		(cotton/polyester)	
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	2
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
ES	Dust	Gloves - Non-specified rubber	7
		Respirator - Disposable filtering half mask	7
		Work wear: breathable (cotton/polyester)	7
ES	Hydraulic boom with air assistance (downward)	Gloves - Neoprene	11
		Gloves - Nitrile	1
		Gloves - Non-specified rubber	9
		Leather/fabric boots	4
		Respirator - Disposable filtering half mask	15
		Respirator - Half mask, reusable with filters	7
		Rubber boots	14
		Type 4 (taped/overlapping seams)	1
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	3
		Work wear: breathable (cotton/polyester)	6
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	11
ES	Hydraulic boom (downward)	Gloves - Neoprene	2
		Gloves - Non-specified rubber	6
		Hat	2
		Leather/fabric boots	3
		Respirator - Disposable filtering half mask	7
		Respirator - Half mask, reusable with filters	1
		Rubber boots	5
		Work wear: breathable (cotton/polyester)	3
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	4
ES	Lever operated/pressurised knapsack	Gloves - Neoprene	1

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Gloves - Non-specified rubber	2
		Respirator - Disposable filtering half mask	2
		Respirator - Half mask, reusable with filters	1
		Rubber boots	3
		Type 4 (taped/overlapping seams)	1
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
ES	Spray lance	Gloves - Non-specified rubber	1
		Respirator - Disposable filtering half mask	1
		Work wear: breathable (cotton/polyester)	1
ES	Motorised knapsack	Gloves - Neoprene	2
		Respirator - Half mask, reusable with filters	2
		Rubber boots	2
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	2
ES	Rotary atomiser (horizontal)	Full length trousers	4
		Gloves - Neoprene	11
		Gloves - Non-specified rubber	12
		Goggles	1
		Hat	1
		Long sleeved shirt	4
		Respirator - Disposable filtering half mask	9
		Respirator - Half mask, reusable with filters	12
		Rubber boots	11
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: breathable (cotton/polyester)	3
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	11
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	4
ES	Shrouded hydraulic boom (horizontal)	Gloves - Neoprene	3
		Respirator - Half mask, reusable with filters	3

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Rubber boots	3
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	3
ES	Tunnel hydraulic sprayer no air assistance	Gloves - Nitrile	1
		Hat	1
		Leather/fabric boots	1
		Respirator - Half mask, reusable with filters	1
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
GR	Broadcast air assisted sprayer	Apron	1
		Full length trousers	29
		Gloves - Fabric/leather	1
		Gloves - Latex	7
		Gloves - Nitrile	29
		Hat	2
		Leather/fabric boots	2
		Long sleeved shirt	29
		Nitrile latex	2
		Normal glasses	1
		Respirator - Disposable filtering half mask	4
		Respirator - Full face mask	18
		Respirator - Half mask, reusable with filters	4
		Respirator - Power assisted	4
		Respirator - Valved filtering half mask	6
		Rubber boots	51
		Type 3 (non-breatheable)	3
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	14
		Work wear: breathable (cotton/polyester)	4
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	10
GR	Dust	Full length trousers	1
		Long sleeved shirt	1
GR	Spray gun	Gloves - Latex	4

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Gloves - Nitrile	5
		Hat	3
		Leather/fabric boots	1
		Respirator - Disposable filtering half mask	4
		Respirator - Full face mask	1
		Respirator - Half mask, reusable with filters	2
		Respirator - Power assisted	2
		Respirator - Valved filtering half mask	2
		Rubber boots	10
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	7
		Work wear: breathable (cotton/polyester)	3
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
GR	Hydraulic boom (downward)	Gloves - Latex	2
		Gloves - Nitrile	1
		Hat	1
		Nitrile latex	1
		Respirator - Full face mask	2
		Respirator - Valved filtering half mask	2
		Rubber boots	4
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	3
GR	Shrouded hydraulic boom (horizontal)	Gloves - Nitrile	1
		Respirator - Full face mask	1
		Rubber boots	1
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
IT	Hydraulic boom (downward)	Full length trousers	8
		Gloves - Butyl rubber	6
		Gloves - Latex	6
		Gloves - Nitrile	15
		Gloves - Non-specified rubber	1
		Gloves - Viton	1
		Hat	3

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Leather/fabric boots	44
		Long sleeved shirt	1
		Nitrile latex	3
		Respirator - Disposable filtering half mask	4
		Respirator - Full face mask	5
		Respirator - Power assisted	20
		Respirator - Valved filtering half mask	3
		Rubber boots	4
		Shorts	4
		T-shirt	11
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	21
		Work wear: breathable (cotton/polyester)	14
IT	Rotary atomiser (horizontal)	Face shield	4
		Full length trousers	2
		Gloves - Butyl rubber	9
		Gloves - Latex	2
		Gloves - Neoprene	2
		Gloves - Nitrile	23
		Gloves - Non-specified rubber	1
		Hat	1
		Leather/fabric boots	39
		Nitrile latex	2
		Respirator - Full face mask	2
		Respirator - Power assisted	14
		Respirator - Valved filtering half mask	11
		Rubber boots	6
		T-shirt	3
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	22
		Work wear: breathable (cotton/polyester)	18
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	5
LT	Hydraulic boom (downward)	Full length trousers	2
		Leather/fabric boots	9
		Long clothes	9
		None	1
		Normal glasses	2

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Normal workwear	7
		Respirator - Disposable filtering half mask	1
		Rubber boots	12
		Short clothes	3
		T-shirt	2
		Work wear: breathable (cotton/polyester)	4
NL	Spray gun	Leather/fabric boots	1
		Work wear: breathable (cotton/polyester)	1
NL	Hydraulic boom with air assistance (downward)	Full length trousers	2
		Leather/fabric boots	2
		Long sleeved shirt	2
		Work wear: breathable (cotton/polyester)	3
NL	Hydraulic boom (downward)	Full length trousers	6
		Gloves - Butyl rubber	2
		Gloves - Latex	1
		Gloves - Neoprene	1
		Gloves - Non-specified rubber	1
		Gloves - Polythene - not used - possibly remove	1
		Hat	1
		Leather/fabric boots	21
		Respirator - Valved filtering half mask	1
		Rubber boots	7
		T-shirt	6
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: breathable (cotton/polyester)	27
NL	Lever operated/pressurised knapsack	Gloves - Butyl rubber	1
		Gloves - Polythene - not used - possibly remove	1
		Leather/fabric boots	7
		Rubber boots	8
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: breathable	12

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		(cotton/polyester)	
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
NL	Spray lance	Gloves - Butyl rubber	1
		Respirator - Disposable filtering half mask	1
		Rubber boots	2
		Work wear: breathable (cotton/polyester)	2
		Work wear: rainwear 1 piece (vinyl, Goretex etc.)	1
NL	Manually folding boom	Full length trousers	1
		T-shirt	1
NL	Shrouded hydraulic boom (horizontal)	Work wear: breathable (cotton/polyester)	1
PL	Broadcast air assisted sprayer	Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: breathable (cotton/polyester)	23
PL	Gantry sprayer	Gloves - Latex	1
		Gloves - Non-specified rubber	1
		Respirator - Disposable filtering half mask	2
		Rubber boots	1
		Safety glasses	1
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1
		Work wear: breathable (cotton/polyester)	1
PL	Hydraulic boom (downward)	Leather/fabric boots	14
		None	3
		Normal workwear	8
		Not used	2
		Rubber boots	1
		Work wear: breathable (cotton/polyester)	23
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	3
UK	Broadcast air assisted sprayer	Face shield	1

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Gloves - Nitrile	2
		Leather/fabric boots	28
		Long clothes	28
		Normal workwear	12
		Rubber boots	7
		Short clothes	25
		T-shirt	3
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	3
		Work wear: breathable (cotton/polyester)	2
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
UK	Granules broadcast (vehicle mounted)	Apron	1
		Leather/fabric boots	1
		Type 3 (non-breatheable)	1
UK	Hydraulic boom (downward)	Face shield	1
		Gloves - Nitrile	1
		Leather/fabric boots	38
		Long clothes	24
		Normal workwear	9
		Rubber boots	17
		Short clothes	17
		Type 3 (non-breatheable)	1
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	11
		Work wear: breathable (cotton/polyester)	10
UK	Lever operated/pressurised knapsack	Face shield	4
		Gloves - Nitrile	15
		Goggles	1
		Leather/fabric boots	7
		Long clothes	1
		Respirator - Half mask, reusable with filters	2
		Respirator - Valved filtering half mask	2
		Rubber boots	10
		Short clothes	1
		Type 3 (non-breatheable)	2
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	8

Country	Method of application	Type of PPE	Number of principal operators wearing the PPE
		Work wear: breathable (cotton/polyester)	8
UK	Spray lance	Face shield	2
		Gloves - Nitrile	1
		Leather/fabric boots	1
		Rubber boots	2
		Work wear: breathable (cotton/polyester)	2
		Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
UK	Molluscicides broadcast (vehicle mounted)	Gloves - Fabric/leather	2
		Gloves - Nitrile	3
		Gloves - Other	1
		Goggles	1
		Leather/fabric boots	4
		Respirator - Half mask, reusable with filters	1
		Rubber boots	8
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	6
		Work wear: breathable (cotton/polyester)	6
UK	Tower sprayer	Leather/fabric boots	2
		Normal workwear	2
UK	Vertical boom	Face shield	1
		Normal glasses	1
		Respirator - Half mask, reusable with filters	1
		Rubber boots	1
		Type 6 (e.g. Tyvek Classic/Kleeguard T56	1

(a): March 2015 download data

Table 35: The number of cab types on a method of application per country basis

Country	Method of application	Cab type	Number of methods of application with cab types
BE	Hydraulic boom (downwards)	Closed cab	28

		Carbon filter	6
		Open cab	3
BE	Lever operated/pressurised knapsack	No cab	1
ES	Dust	No cab	8
ES	Hydraulic boom with air assistance (downwards)	No cab	22
ES	Hydraulic boom (downwards)	No cab	10
ES	Lever operated/pressurised knapsack	No cab	5
ES	Spray lance	No cab	1
ES	Motorised knapsack	No cab	4
ES	Rotary atomiser (horizontal)	No cab	23
ES	Shrouded hydraulic boom (horizontal)	No cab	3
ES	Tunnel air assisted sprayer	Open cab	1
ES	Tunnel hydraulic sprayer (no air assistance)	No cab	1
GR	Spray lance	No cab	9
GR	Shrouded hydraulic boom (horizontal)	Open cab	1
IT	Broadcast air assisted sprayer	Carbon filter	3
		Open cab	1
IT	Hydraulic boom (downwards)	Carbon filter	37
		Closed cab	6
		Cab with no filter	2
		Open cab	2
		No cab	1
IT	Rotary atomiser (horizontal)	Carbon filter	34
		Open cab	13

		Closed cab	3
		No cab	1
LT	Hydraulic boom (downwards)	Closed cab	26
		Carbon filter	4
		Cab with no filter	1
NL	Spray gun	No cab	1
NL	Hydraulic boom with air assistance (downwards)	Carbon filter	1
		Closed cab	1
		No cab	1
NL	Hydraulic boom (downwards)	Closed cab	17
		Carbon filter	10
		Open cab	3
		No cab	2
NL	Lever operated/pressurised knapsack	No cab	15
NL	Spray lance	No cab	5
NL	Manually folding boom	Carbon filter	1
NL	Shrouded hydraulic boom (horizontal)	Closed cab	1
PL	Broadcast air assisted sprayer	Closed cab	21
		Carbon filter	3
PL	Gantry sprayer	No cab	1
		Open cab	1
PL	Hydraulic boom (downwards)	Closed cab	20
		Cab with no filter	9
		Carbon filter	8
		Open cab	4
PL	Manually folding boom	Closed cab	19
		Carbon filter	1
UK	Broadcast air assisted sprayer	Carbon filter	31
		Cab with no filter	1

		Closed cab	1
		No cab	1
UK	Granules broadcast (vehicle mounted)	Carbon filter	2
UK	Hydraulic boom with air assistance (downwards)	Carbon filter	1
UK	Hydraulic boom (downwards)	Carbon filter	39
		Open cab	4
		Closed cab	3
		No cab	2
		Cab with no filter	1
UK	Lever operated/pressurised knapsack	No cab	21
UK	Spray lance	No cab	4
UK	Molluscicdes broadcast (vehicle mounted)	Carbon filter	7
		No cab	7
		Closed cab	2
		Open cab	2
UK	Tower sprayer	Carbon filter	2
UK	Vertical Boom	Open cab	1

(a): March 2015 download data

3.3.1. Non-dietary exposure of principal operators – Case studies

The data collected on the worker activities of the principal operator were not considered a priority following the teleconference with EFSA in the summer of 2013 (see section 2.1.5). Therefore many of the data are missing for individual operators. However, where data are present it should be a complete picture of the other work conducted by the principal operator.

Examples of the data collated have been evaluated using case studies for three of the countries (Lithuania, United Kingdom and Greece) to show how the data can be selected for an individual farm and for a principal operator. These case studies provide only an example of the data and cannot be considered representative of the farms in each group. These data sets serve as examples for the scenario setting required in the modelling and development of risk assessments for cumulative exposure to PPPs.

In the subsequent case study tables below, the headings from the database have been used in the tables to allow easier read across to database outputs. The key for these headings is shown below.

actdate	Activity date
actname	Active substance name
dte	Date
fieldno	Field number on the holding
holno	Holding number
kgai	Total kg of active substance
kgtot	Total kg of product
m_app	Method of application (see Section 2.1.1.1)
name	Name of the crop
nhours	Number of hours spent on the activity
opm_app	Specific operator/worker activity (see Section 2.1.1.2)
optype	Category of operator activity (see Section 2.1.1.2)
ppenum	Number of days between cleaning or disposing of PPE (See Section 2.1.1.3)
ppetype	Type of personal protective equipment (See Section 2.1.1.3)
product	Commercial product name (allows identification of products with more than one a.s.)
sp_rnd	Spray round
start	Start time of the activity
sum(nhours)	Time (h) spent applying PPPs

3.3.1.1. Extraction of data sets for case studies

Details of the data extraction are shown below with the SQL code used to provide the detailed data for the UK case study. The holding number (holno) selected was 14428 for the UK. The code is presented by Form number, which relates to the survey form number shown in Appendix G and described in detail in Section 2.1.3. Data sets for further case studies were extracted by changing the holding number code.

{FORM 1}

{CROPPING}

```
select distinct country.code,holno,crop.name,crop.code,crops.actual_crop, sum(area)
from form1,country,crops,crop
where form1.country = country.id
and form1.id = crops.form1_id
and crop.id = crops.crop_id
and holno = "14428"
group by 1,2,3,4,5;
```

{CROPPING & OPERATORS}

```
select distinct country.code,holno,
actual_crop,
op1,op2,op3,op4,op5
from form1,country,crops,crop
where form1.country = country.id
and form1.id = crops.form1_id
and crop.id = crops.crop_id
and holno = "14428"
group by 1,2,3,4,5,6,7,8
order by 1,2,3,4;
```

{FORM 2}

{NUMBER OF FARMS MANAGED, CROPPING AREAS & PERCENTAGE RECORDS}

```
select distinct country.code,holno,f2a, f2b,f2bb
from form1,country,form2
where form1.country = country.id
and form1.id = form2.form1_id
and holno = "14428"
order by 1,2,3;
```

{SPRAY OPERATORS & SPRAY DECISIONS}

```
select distinct country.code,holno,f2c,f2d,f2f
from form1,country,form2
where form1.country = country.id
and form1.id = form2.form1_id
and holno = "14428"
order by 1,2;
```

{PRESENCE OF WATERCOURSES AND USE OF BUFFER STRIPS}

```
select distinct country.code,holno,
g1,g2,g3,g4,g5
from form1,country,form2
where form1.country = country.id
and form1.id = form2.form1_id
and holno = "14428"
order by 1,2;
```

{INTEGRATED PEST MANAGEMENT}

```
select distinct country.code,holno,
ipmh,ipmha, ipmhb, ipmhc, ipmhd, ipmhe, ipmhf, ipmhg
from form1,country,form2
where form1.country = country.id
and form1.id = form2.form1_id
and holno = "14428"
order by 1,2;
```

{IPM DETAIL}

```
select distinct country.code,holno,
impdet
from form1,country,form2
where form1.country = country.id
and form1.id = form2.form1_id
and holno = "14428"
order by 1,2;
```

{FORM 3}

{CROPS SAMPLED,AREAS,PROTECTION}

```
select distinct country.code, concat(holno,fieldno), crop.name, crop.code, syear, sum(area)
from form1,country,form3,crop
where form1.country = country.id
and form1.id = form3.form1_id
and crop.id = form3.crop_id
and holno = "14428"
group by 1,2,3,4,5
order by 1,2,5;
```

{PESTICIDE APPLICATIONS}

```
select distinct country.code,concat(holno,fieldno), crop.name, crop.code, syear, op_no,sum(area_treated)
from form1,country,form3,form3a,crop
where form1.country = country.id
and form1.id = form3.form1_id
and form3.id = form3a.form3_id
and crop.id = form3.crop_id
and holno = "14428"
and m_app != "ST"
group by 1,2,3,4,5,6
order by 1,2;

{CALCULATING THE NUMBER OF HOURS SPENT SPRAYING BY AN OPERATOR}

drop temporary table if exists t1;

create temporary table t1
select distinct crop.name crop, crop.code, fieldno,op_no,m_app, sp_no, nz_no,sp_rnd,
actdate, start, nhours, area_treated
from form3, form3a, crop, form1,country
where form3a.form3_id = form3.id
and form1.country = country.id
and crop.id = crop_id
and form3.form1_id = form1.id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01";

select op_no,actdate,sum(nhours)
from t1
group by 1,2
order by 1,2;

select op_no,crop,m_app,sp_no,nz_no,actdate,sum(nhours)
from t1
group by 1,2,3,4,5,6
order by 1,6,3;

{SUMMARY DATA}

select op_no,sum(nhours)
```

```
from t1
group by 1;

select op_no,sum(area_treated),sum(nhours)
from t1
group by 1
order by 1;

select op_no,crop,sum(nhours)
from t1
group by 1,2
order by 1,2;

select op_no,m_app,sum(nhours)
from t1
group by 1,2
order by 1,2;
```

{AMOUNT OF ACTIVE SUBSTANCE APPLIED}

```
select distinct concat(holno, fieldno) fieldno, op_no,sp_no,nz_no,crop.name,actdate,product,
m_app, sp_rnd,active.name actname,start,nhours,sum((area_treated*new_amt)*(newai/100)) kgtot,
sum((area_treated*new_amt)*(newai/100) * proportion) kgai
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
group by 1,2,3,4,5,6,7,8,9,10,11,12
order by 1,2,6,9,7;
```

{NON-CROP AREAS}

```
select distinct concat(holno, fieldno) fieldno, op_no,sp_no,nz_no,crop.name,actdate,product,
m_app, sp_rnd,active.name actname,start,nhours,sum((new_amt)*(newai/100)) kgtot,
sum((new_amt)*(newai/100) * proportion) kgai
```

```
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
and crop.name = "Non Crop Use"
group by 1,2,3,4,5,6,7,8,9,10,11,12
order by 1,2,6,9,7;

{EXPOSURE TO ACTIVE BY DATE}

drop temporary table if exists t1;

create temporary table t1
select distinct concat(holno, fieldno), op_no,crop.name,actdate,product,active.name actname,start,nhours,
sum((area_treated*new_amt)*(newai/100)) kgtot,
sum((area_treated*new_amt)*(newai/100) * proportion) kgai
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
and crop.name != "Non Crop Use"
group by 1,2,3,4,5,6,7,8
order by op_no,actdate;

select op_no,actdate,actname, sum(nhours), sum(kgai)
from t1
group by 1,2,3;
```

```
{NON-CROP AREAS}

drop temporary table if exists t1;

create temporary table t1
select distinct concat(holno, fieldno), op_no,crop.name,actdate,product,active.name actname,start,nhours,
sum((new_amt)*(newai/100)) kgtot,
sum((new_amt)*(newai/100) * proportion) kgai
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
and crop.name = "Non Crop Use"
group by 1,2,3,4,5,6,7,8
order by op_no,actdate;
select op_no,actdate,actname, sum(nhours), sum(kgai)
from t1
group by 1,2,3;

{EXPOSURE TO ACTIVE - SUMMARY}

drop temporary table if exists t1;

create temporary table t1
select distinct concat(holno, fieldno), op_no,crop.name,actdate,product,active.name actname,start,nhours,
sum((area_treated*new_amt)*(newai/100)) kgtot,
sum((area_treated*new_amt)*(newai/100) * proportion) kgai
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
```

```
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
and crop.name != "Non Crop Use"
group by 1,2,3,4,5,6,7,8
order by op_no,actdate;
select op_no,actname, sum(nhours), sum(kgai)
from t1
group by 1,2;

{NON-CROP AREAS}

drop temporary table if exists t1;

create temporary table t1
select distinct concat(holno, fieldno), op_no,crop.name,actdate,product,active.name actname,start,nhours,
sum((new_amt)*(newai/100)) kgtot,
sum((new_amt)*(newai/100) * proportion) kgai
from form3, form3a, crop, form1,product,active_substance,active
where form3a.form3_id = form3.id
and crop.id = crop_id
and form3.form1_id = form1.id
and product.id = form3a.productnum
and product.id = active_substance.productnum
and active.id = active_substance.ai_id
and holno = "14428"
and m_app != "ST"
and nhours != "99"
and syear = "13"
and op_no = "01"
and crop.name = "Non Crop Use"
group by 1,2,3,4,5,6,7,8
order by op_no,actdate;
select op_no,actname, sum(nhours), sum(kgai)
from t1
group by 1,2;


{FORM 4}

{FORM 4 - BASIC INFORMATION}
```

```
select country.code,holno,opno,age,gender,status,optype,sprayexp,percspray,
certify,certyr, certtype, spraying_other_farms,spraying_other_farms_perc
from form1,form4,country
where form4.form1_id = form1.id
and country.id = form1.country
and holno = "14428"
and opno = "OP01"
order by 1,2,3;
```

{FORM 4a - MIXING, LOADING & CLEANING - DETAIL}

```
select country.code,holno,form4.opno,osspno,sp1,m1,m2,c1,c1num
from form1,form4,form4a,country,form5
where form4.form1_id = form1.id
and form4.id = form4a.form4_id
and form5.form1_id = form1.id
and osspno = spno
and country.id = form1.country
and holno = "14428"
and opno = "OP01"
order by 1,2,3,4;
```

{FORM 4b - USE OF PPE}

```
select country.code,holno,opno,form4b.optype,opm_app,ppetype,ppe_lookup.description,ppenum
from form1,form4,form4b,country,ppe_lookup
where form4.form1_id = form1.id
and form4.id = form4b.form4_id
and ppe_lookup.code = ppetype
and country.id = form1.country
and holno = "14428"
and opno = "OP01"
order by 1,2,3,4,5,6;
```

{FORM 5}

{FORM 5 - SPRAYER DETAILS (1)}

```
select country.code,holno,spno,sp1,mapp_lookup.description,spname,spowner,sptest,sd1,sd2,sd3
```

```
from form1,form5,country,mapp_lookup
where form5.form1_id = form1.id
and country.id = form1.country
and mapp_lookup.code = sp1
and holno = "14428"
order by 1,2,3;
```

{FORM 5 - SPRAYER DETAILS (2)}

```
select country.code,holno,spno,sp1,sd4m,sd4a,sd4h,sd5,sd6,sd6a,sd7,spother
from form1,form5,country
where form5.form1_id = form1.id
and country.id = form1.country
and holno = "14428"
order by 1,2,3;
```

{FORM 5 - PESTICIDE FILLING SYSTEMS}

```
select country.code,holno,spno,sp1,pfdp,pfib,pfsl,pfct,pfot
from form1,form5,country
where form5.form1_id = form1.id
and country.id = form1.country
and holno = "14428"
order by 1,2,3;
```

{FORM 5 - NOZZLE INFORMATION}

{NOZZLES - DETAILED INFORMATION}

```
select country.code,holno,spno,sp1,nset,ntype,nname,nbar,nmonths,lowdrift
from form1,form5,form5a,country
where form5.form1_id = form1.id
and form5.id = form5a.form5_id
and country.id = form1.country
and holno = "14428"
order by 1,2,3,4;
```

{FORM 6}

{FORM 6 - DAILY, WEEKLY & MONTHLY HOURS}

```
select country.code,holno,opno,mth,dy,wk
from form1,form6,form6b,country
where form6.form1_id = form1.id
and country.id = form1.country
and form6.id = form6b.form6_id
and holno = "14428"
and opno = "OP01"
order by 1,2,4;
```

{FORM 6 - ACTIVITY SUMMARY}

```
select distinct country.code, holno,
form6.opno,activity,activity_lookup.description,ppetype,ppe_lookup.description,actual_crop
from form1,form6,form6a,country,activity_lookup,form4,form4b,ppe_lookup
where form6.form1_id = form1.id
and form6.id = form6a.form6_id
and form4.id = form4b.form4_id
and form1.id = form4.form1_id
and country.id = form1.country
and activity_lookup.code = form6a.activity
and ppe_lookup.code = form4b.ppetype
and form6a.activity = form4b.opm_app
and holno = "14428"
and form6.opno = "OP01"
and form4b.optype = "WA"
order by 4;
```

{FORM 6 - ACTIVITY DETAIL}

```
select distinct country.code, holno,
form6.opno,actdate,form6a.dte,activity,activity_lookup.description,ppetype,ppe_lookup.description,actual_cro
p
from form1,form6,form6a,country,activity_lookup,form4,form4b,ppe_lookup
where form6.form1_id = form1.id
and form6.id = form6a.form6_id
and form4.id = form4b.form4_id
and form1.id = form4.form1_id
and country.id = form1.country
and activity_lookup.code = form6a.activity
and ppe_lookup.code = form4b.ppetype
and form6a.activity = form4b.opm_app
and holno = "14428"
and form6.opno = "OP01"
```

```
and form4b.optype = "WA"
order by 7,4;

{FORM 6 - ACTIVITY - HOURS WORKED}

select distinct country.code, holno,
opno,actdate,form6a.dte,activity,activity_lookup.description,actual_crop,nhours
from form1,form6,form6a,country,activity_lookup
where form6.form1_id = form1.id
and form6.id = form6a.form6_id
and country.id = form1.country
and activity_lookup.code = form6a.activity
and holno = "14428"
and opno = "OP01"
order by 1,2 desc;

{FORM 6 - SOWING TREATED SEED}

drop temporary table if exists t1;

create temporary table t1
select distinct
country.code,form6a.field_no,m_app,sp_rnd,form6a.actdate wkdate,
form3a.actdate prddte,product.product,active.name,
opno,activity,description, form3a.nhours drilltime,form6a.nhours wkhrs,
sum((area*new_amt)*(newai/100)) kgtot,
sum((area_treated*new_amt)*(newai/100) * proportion) kgai
from form1,form6,form6a,country,activity_lookup,form3,form3a,product,active_substance,active
where form6.form1_id = form1.id
and form3.form1_id = form1.id
and form6.id = form6a.form6_id
and country.id = form1.country
and activity_lookup.code = form6a.activity
and form3.id = form3a.form3_id
and concat(holno,fieldno) = form6a.field_no
and product.id = form3a.productnum
and active_substance.productnum = product.id
and active.id = active_substance.ai_id
and form6a.actdate is not null
and holno = "14428"
and syear = "13"
and opno = "OP01"
and form3a.nhours != "99"
and form6a.nhours != "99"
```

```
and m_app = "ST"
group by 1,2,3,4,5,6,7,8,9,10,11,12,13
order by 1,3,4;

select * from t1
order by 2;
```

3.3.1.2. Case study - Northern zone - Lithuania

In the case of the LT dataset a farm (LTA16) has been selected which is considered a typical farm (104.7 ha) with only one spray operator growing three crops (barley, summer oilseed rape and winter wheat) (Table 36).

Table 36: Details of the farm selected for the LT case study (Forms 1 and 2)

Details	Response			
NUMBER OF FARMS MANAGED & CROPPING AREAS				
number of farms managed	1			
area of farm (all crops) ha	104.7			
% of farm sampled	100 [a]			
SPRAY OPERATORS				
number of spray operators	1			
% treated by contractor	0			
use of agronomists	FALSE			
CROPPING	name	code	actual_crop	sum(area) ha
	Barley	P0500010A	Barley	26
	Rape seed	P0401060A	Summer oilseed rape	2
	Wheat	P0500090A	Winter wheat	47
WATERCOURSES & USE OF BUFFER STRIPS ON THE FARM				
permanent watercourse	FALSE			
temporary watercourse	TRUE			
field margin buffer strips	TRUE			
wind breaks	FALSE			
in-crop buffer strips	FALSE			
INTEGRATED CROP MANAGEMENT ON THE FARM				
IPM used on farm?	TRUE			
crop rotation	FALSE			
resistant varieties	TRUE			
monitoring traps	FALSE			
biological control	FALSE			
predictive models	TRUE			
beneficial populations	FALSE			
optimise pesticide choice	FALSE			

additional details	none

(a): December 2014 download data

The data from the LT case study are presented in a number of forms to illustrate the data. In Table 37 the summary cropping data for the farm are shown, indicating the areas grown of each crop, and the total areas actually treated with pesticide in 2013. Some of the fields were treated several times and/or tank mixes were used; hence the large treated areas as presented in the table when compared to the area grown. PPP applications sorted by the field number and date of application and date of application in chronological order are provided in Table 38 and Table 39, respectively.

Table 40 provides details of the time the principal spray operator spent applying PPPs per crop per day, and per day in chronological order. In total during the 2013 cropping year the principal operator on the farm spent 42 h applying PPPs over 270 ha. Overall ten active ingredients were used throughout the year and Table 45 provides details of the identity, mass applied and time spent for each active ingredient per day by the principal operator. This information provides details of what the operator used on a daily basis on the farm. The active ingredient used can be summed for daily, weekly or monthly uses etc.

Table 42 provides details of the principal operator and the sprayers on the LT case study farm. Table 43 provides information on the PPE worn by the principal operator during spraying and other worker activities and Table 44 provides details of the date and time spent by the principal operator on other worker activities.

Table 37: Crops surveyed on the farm selected in 2013 for the LT case study (Form 3)

code	concat(holno,fieldno)	name	code	area grown (ha)	area treated (ha) [a,b]
LT	LTA1601	Rape seed	P0401060A	1.83	7.32
LT	LTA1602	Wheat	P0500090A	11.75	47.0
LT	LTA1603	Wheat	P0500090A	34.97	139.88
LT	LTA1604	Barley	P0500010A	25.57	76.71
LT	LTA1605	Other cereals	P0500990A	15.13	45.39
			TOTAL	89.3	316.3

(a): the area treated excludes seed treatments
(b): includes cumulative applications to the same field and the area of each product within a tank mix
(c): December 2014 download data

Table 38: PPP application data for the LT case study, sorted by field number and date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
LTA1601	Rape seed	08/05/2013	Teridox 500 EC	HD	1	Dimethachlor	06:30	0.42	1.83	1.83
LTA1601	Rape seed	10/05/2013	Brasan 540 EC	HD	2	Dimethachlor	08:30	0.42	1.98	1.83
LTA1601	Rape seed	10/05/2013	Brasan 540 EC	HD	2	Clomazone	08:30	0.42	1.98	0.15
LTA1601	Rape seed	12/06/2013	Plenum 50 WG	HD	3	Pymetrozine	22:00	0.42	0.14	0.14
LTA1601	Rape seed	31/08/2013	Roundup Max	HD	4	Glyphosate	08:00	0.33	2.59	2.59
LTA1602	Wheat	28/05/2013	Cycogan	HD	1	Chlormequat chloride	05:00	2	8.72	8.72
LTA1602	Wheat	28/05/2013	Leander	HD	1	Fenpropidin	05:00	2	3.70	3.70
LTA1602	Wheat	14/06/2013	Orius 250 EW	HD	2	Tebuconazole	05:00	2	2.85	2.85
LTA1602	Wheat	07/09/2013	Ranger	HD	3	Glyphosate	08:00	1.5	11.89	11.89
LTA1603	Wheat	28/05/2013	Cycogan	HD	1	Chlormequat chloride	07:30	6	25.97	25.97
LTA1603	Wheat	28/05/2013	Leander	HD	1	Fenpropidin	07:30	6	11.02	11.02
LTA1603	Wheat	14/06/2013	Orius 250 EW	HD	2	Tebuconazole	07:30	6	8.48	8.48
LTA1603	Wheat	27/08/2013	Glyphogan 360	HD	3	Glyphosate	10:00	5	33.36	33.36
LTA1604	Barley	27/05/2013	Trimmer 50 SG	HD	1	Tribenuron-methyl	06:00	4	0.26	0.26
LTA1604	Barley	02/06/2013	Fandango	HD	2	Fluoxastrobin	20:00	4	4.35	2.17
LTA1604	Barley	02/06/2013	Fandango	HD	2	Prothioconazole	20:00	4	4.35	2.17
LTA1604	Barley	20/09/2013	Roundup Max	HD	3	Glyphosate	16:00	3.5	28.69	28.69
LTA1605	Other cereals	05/06/2013	Prosaro	HD	1	Tebuconazole	21:30	2.5	3.78	1.89
LTA1605	Other cereals	05/06/2013	Prosaro	HD	1	Prothioconazole	21:30	2.5	3.78	1.89
LTA1605	Other cereals	20/06/2013	Ranger	HD	2	Glyphosate	19:00	2	14.16	14.16
LTA1605	Other cereals	31/08/2013	Roundup Max	HD	3	Glyphosate	19:00	2	21.50	21.50

(a): December 2014 download data

Table 39: PPP application data for the LT case study, sorted by date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
LTA1601	Rape seed	08/05/2013	Teridox 500 EC	HD	1	Dimethachlor	06:30	0.42	1.83	1.83
LTA1601	Rape seed	10/05/2013	Brasan 540 EC	HD	2	Dimethachlor	08:30	0.42	1.98	1.83
LTA1601	Rape seed	10/05/2013	Brasan 540 EC	HD	2	Clomazone	08:30	0.42	1.98	0.15
LTA1604	Barley	27/05/2013	Trimmer 50 SG	HD	1	Tribenuron-methyl	06:00	4	0.26	0.26
LTA1602	Wheat	28/05/2013	Cycogan	HD	1	Chlormequat chloride	05:00	2	8.72	8.72
LTA1602	Wheat	28/05/2013	Leander	HD	1	Fenpropidin	05:00	2	3.70	3.70
LTA1603	Wheat	28/05/2013	Cycogan	HD	1	Chlormequat chloride	07:30	6	25.97	25.97
LTA1603	Wheat	28/05/2013	Leander	HD	1	Fenpropidin	07:30	6	11.02	11.02
LTA1604	Barley	02/06/2013	Fandango	HD	2	Fluoxastrobin	20:00	4	4.35	2.17
LTA1604	Barley	02/06/2013	Fandango	HD	2	Prothioconazole	20:00	4	4.35	2.17
LTA1605	Other cereals	05/06/2013	Prosaro	HD	1	Tebuconazole	21:30	2.5	3.78	1.89
LTA1605	Other cereals	05/06/2013	Prosaro	HD	1	Prothioconazole	21:30	2.5	3.78	1.89
LTA1601	Rape seed	12/06/2013	Plenum 50 WG	HD	3	Pymetrozine	22:00	0.42	0.14	0.14
LTA1602	Wheat	14/06/2013	Orius 250 EW	HD	2	Tebuconazole	05:00	2	2.85	2.85
LTA1603	Wheat	14/06/2013	Orius 250 EW	HD	2	Tebuconazole	07:30	6	8.48	8.48
LTA1605	Other cereals	20/06/2013	Ranger	HD	2	Glyphosate	19:00	2	14.16	14.16
LTA1603	Wheat	27/08/2013	Glyphogan 360	HD	3	Glyphosate	10:00	5	33.36	33.36
LTA1601	Rape seed	31/08/2013	Roundup Max	HD	4	Glyphosate	08:00	0.33	2.59	2.59
LTA1605	Other cereals	31/08/2013	Roundup Max	HD	3	Glyphosate	19:00	2	21.50	21.50
LTA1602	Wheat	07/09/2013	Ranger	HD	3	Glyphosate	08:00	1.5	11.89	11.89
LTA1604	Barley	20/09/2013	Roundup Max	HD	3	Glyphosate	16:00	3.5	28.69	28.69

(a): December 2014 download data

Table 40: Details of the time the principal spray operator spent applying PPPs per crop in chronological order for the LT case study (Forms 3)

crop	actdate	sum(nhours) per crop	sum(nhours) per day
Rape seed	08/05/2013	0.42	0.42
Rape seed	10/05/2013	0.42	0.42
Barley	27/05/2013	4	4
Wheat	28/05/2013	8	8
Barley	02/06/2013	4	4
Other cereals	05/06/2013	2.5	2.5
Rape seed	12/06/2013	0.42	0.42
Wheat	14/06/2013	8	8
Other cereals	20/06/2013	2	2
Wheat	27/08/2013	5	5
Rape seed	31/08/2013	0.33	2.33
Other cereals	31/08/2013	2	-
Wheat	07/09/2013	1.5	1.5
Barley	20/09/2013	3.5	3.5
	TOTAL		42

(a): These figures exclude seed treatments and days upon which the number of hours spent spraying was unknown (99)
(b): December 2014 download data

Table 41: Details of the active ingredients, mass applied and time spent for each active ingredient per day in chronological order for the LT case study (Forms 3)

actdate	actname	sum(nhours)	sum(kgai)
08/05/2013	Dimethachlor	0.4	1.83
10/05/2013	Clomazone	0.4	0.15
10/05/2013	Dimethachlor	0.4	1.83
27/05/2013	Tribenuron-methyl	4.0	0.26
28/05/2013	Chlormequat chloride	8.0	34.69
28/05/2013	Fenpropidin	8.0	14.72
02/06/2013	Fluoxastrobin	4.0	2.17
02/06/2013	Prothioconazole	4.0	2.17
05/06/2013	Prothioconazole	2.5	1.89
05/06/2013	Tebuconazole	2.5	1.89
12/06/2013	Pymetrozine	0.4	0.14
14/06/2013	Tebuconazole	8.0	11.33
20/06/2013	Glyphosate	2.0	14.16
27/08/2013	Glyphosate	5.0	33.36
31/08/2013	Glyphosate	2.3	24.09
07/09/2013	Glyphosate	1.5	11.89
20/09/2013	Glyphosate	3.5	28.69

(a): December 2014 download data

Table 42: Details of the principal operator and sprayer details for the LT case study (Forms 4 and 5)

Details	Response	Detail
PRINCIPAL OPERATOR		
age (y)	44	
gender	M	
status	FT (full-time)	
optype	OT (owner/tenant)	Relationship to the holding
sprayexp	20	Years of spraying experience
percspray	100	Percentage of all spraying undertaken
certify	Y	Spraying certificate
certtype	TH (theory (desk based))	PPE application certificate type
SPRAYER DETAILS		
spno	01	Farm sprayer number
sp1	HD (hydraulic boom (downwards))	Sprayer type
spname	Unia Group Lux 1015X	Manufacturers name and model
spowner	FM (farm owned)	Sprayer owner
sptest	TRUE	Testing of sprayer as part of a sprayer testing scheme
sd1	100	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	8	Typical sprayer speed
main tank capacity	1000	(L)
auxillary tank capacity	100	(L)
hand wash capacity	15	(L)
sd5	15	Boom width (m)
age	2	Sprayer age (y)
m & l time	0.5	Mixing and loading time on each load (h)
m & l/day	2	Mixing and loading events in a day
cleaning time	0.5	Average time spent cleaning sprayer (h)
cleaning/yr	2	Average number times sprayer cleaned in a year

(a): December 2014 download data

Table 43: PPE used by the principal operator in LT case study during spraying and worker activities (Form 4)

optype	opm_app	description	ppetype	description	ppenum
AP	HD	Pesticide application (Hydraulic boom)	NW	Normal workwear	2
AP	HD	Pesticide application (Hydraulic boom)	RB	Rubber boots	unknown
CL	CL	Cleaning the sprayer	LB	Leather/fabric boots	unknown
CL	CL	Cleaning the sprayer	NW	Normal workwear	2
ML	ML	Mixing and loading (liquids)	C4	Work wear: breathable (cotton/polyester)	3
ML	ML	Mixing and loading (liquids)	GN	Gloves - Nitrile	1
ML	ML	Mixing and loading (liquids)	RB	Rubber boots	unknown
ML	ML	Mixing and loading (liquids)	RH	Respirator - Disposable filtering half mask	3
ML	MS	Mixing and loading (solids)	C4	Work wear: breathable (cotton/polyester)	3
ML	MS	Mixing and loading (solids)	GN	Gloves - Nitrile	1
ML	MS	Mixing and loading (solids)	RB	Rubber boots	unknown
ML	MS	Mixing and loading (solids)	RH	Respirator - Disposable filtering half mask	3
WA	DL	Worker activities (drilling/filling)	NW	Normal workwear	2
WA	DL	Worker activities (drilling/filling)	RB	Rubber boots	unknown
WA	IN	Worker activities (inspection)	NW	Normal workwear	2
WA	IN	Worker activities (inspection)	RB	Rubber boots	Unknown

(a): December 2014 download data

Table 44: Date and time spent by the principal operator in the LT case study on other worker activities (Form 6)

actdate	dte	activity	description	actual_crop	nhours
27/04/2013	-	DL	Drilling/filling	Barley	8
27/04/2013	-	DL	Drilling/filling	Summer oilseed rape	1.2
29/04/2013	-	DL	Drilling/filling	Barley	10
30/04/2013	-	DL	Drilling/filling	Triticale	9
-	M5	IN	Inspection	Any crop	0.33
-	L5	IN	Inspection	Any crop	0.33
-	E6	IN	Inspection	Any crop	0.33
-	M6	IN	Inspection	Any crop	0.33
-	E7	IN	Inspection	Any crop	0.33
-	M7	IN	Inspection	Any crop	0.33
-	L7	IN	Inspection	Any crop	0.33
-	E8	IN	Inspection	Any crop	0.33
-	M8	IN	Inspection	Any crop	0.33
-	L8	IN	Inspection	Any crop	0.33
20/09/2013	-	ST	Sorting	Winter wheat	2
23/09/2013	-	DL	Drilling/filling	Winter wheat	2
-	UN	ER	Earliest R-entry time	All crops	-

(a): December 2014 download data

3.3.1.3. Case study - Central zone - United Kingdom

In the case of the UK dataset a farm has been selected which is considered a typical arable farm (303 ha) with only one spray operator growing five crops (winter barley, winter oilseed rape, sugar beet, spring wheat and winter wheat) (Table 45).

Table 45: Details of the farm selected for the UK case study (Forms 1 and 2)

Details	Response			
NUMBER OF FARMS MANAGED & CROPPING AREAS				
number of farms managed	1			
area of farm (all crops) ha	303			
% of farm sampled	100 [a]			
SPRAY OPERATORS				
number of spray operators	1			
% treated by contractor	5			
use of agronomists	TRUE			
CROPPING	name	code	actual_crop	sum(area) ha
	Barley	P0500010A	Winter barley	32
	Non Crop Use	PXXXXXXA	Grainstores	0
	Rape seed	P0401060A	Winter oilseed rape	38
	Sugar beet	P0900010A	Sugar beet	38
	Wheat	P0500090A	Spring wheat	13
	Wheat	P0500090A	Winter wheat	84
WATERCOURSES & USE OF BUFFER STRIPS ON THE FARM				
permanent watercourse	TRUE			
temporary watercourse	TRUE			
field margin buffer strips	TRUE			
wind breaks	FALSE			
in-crop buffer strips	FALSE			
INTEGRATED CROP MANAGEMENT ON THE FARM				
IPM used on farm?	TRUE			
crop rotation	TRUE			
resistant varieties	TRUE			
monitoring traps	TRUE			
biological control	FALSE			
predictive models	FALSE			
beneficial populations	FALSE			
optimise pesticide choice	TRUE			
additional details	Wheat OWBM resistant varieties			
	Used pheromone traps in past for dry harvest peas			
	Take agronomists advice on Chlorpyrifos use			
	Aware of "Say no to drift"			
	Use Aphox to protect bees when have to use insecticides			
	Care taken when using Chlorpyrifos (Dursban)			

(a): For this survey this figure is an indication of the percentage of the principal operators spraying activities throughout 2013

(b): December 2014 download data

The data from the UK case study are presented in a number of forms to illustrate the data. In Table 46 the summary cropping data for the farm are shown, indicating the areas grown of each crop, and the total areas actually treated with pesticide in 2013. Some of the fields were treated several times and/or tank mixes were used; hence the large treated areas as presented in the table when compared to the area grown. PPP applications sorted by the field number and date of application, and date of application in chronological order are provided in Table 47 and Table 48, respectively.

Table 49 provides details of the time the principal spray operator spent applying PPPs per crop per day, and per day in chronological order. In total during the 2013 cropping year the principal operator on the farm spent 112 h applying PPPs over 1211 ha. Overall 44 active ingredients were used throughout the year and Table 50 provides details of the identity, mass applied and time spent for each active ingredient per day by the principal operator. This information provides details of what the operator used on a daily basis on the farm. The active ingredient used can be summed for daily, weekly or monthly uses etc.

Table 51 provides details of the principal operator and the sprayers on the UK case study farm. Table 52 provides information on the PPE worn by the principal operator during spraying and other worker activities and Table 53 provides details of the date and time spent by the principal operator on other worker activities.

Table 46: Crops surveyed on the farm selected in 2013 for the UK case study (Form 3)

code	concat(holno,fieldno)	name	code	area grown (ha)	area treated (ha) [a,b]
UK	1442801	Wheat	P0500090A	12.98	181.72
UK	1442802	Rape seed	P0401060A	8.21	82.10
UK	1442803	Sugar beet	P0900010A	5.85	58.50
UK	1442804	Wheat	P0500090A	7.10	78.10
UK	1442805	Barley	P0500010A	6.00	72.00
UK	1442806	Wheat	P0500090A	6.75	87.75
UK	1442807	Sugar beet	P0900010A	4.43	44.30
UK	1442808	Wheat	P0500090A	11.32	135.84
UK	1442809	Barley	P0500010A	4.80	57.60
UK	1442810	Wheat	P0500090A	5.90	76.70
UK	1442811	Barley	P0500010A	3.95	39.50
UK	1442812	Wheat	P0500090A	7.20	93.60
UK	1442813	Rape seed	P0401060A	4.25	34.00
UK	1442814	Sugar beet	P0900010A	5.02	45.18
UK	1442815	Rape seed	P0401060A	5.83	52.47
UK	1442816	Wheat	P0500090A	2.69	34.97
UK	1442817	Wheat	P0500090A	7.12	99.68
UK	1442818	Wheat	P0500090A	8.00	96.00
UK	1442819	Rape seed	P0401060A	5.12	51.20
UK	1442820	Wheat	P0500090A	7.00	98.00
UK	1442821	Barley	P0500010A	2.55	30.60
UK	1442822	Sugar beet	P0900010A	2.30	16.10

code	concat(holno,fieldno)	name	code	area grown (ha)	area treated (ha) [a,b]
UK	1442823	Barley	P0500010A	4.00	56.00
UK	1442824	Sugar beet	P0900010A	3.71	29.68
UK	1442825	Rape seed	P0401060A	7.00	63.00
UK	1442826	Barley	P0500010A	11.00	154.00
UK	1442827	Wheat	P0500090A	8.40	117.60
UK	1442828	Sugar beet	P0900010A	7.50	45.00
UK	1442829	Rape seed	P0401060A	6.00	66.00
UK	1442830	Sugar beet	P0900010A	9.65	77.20
UK	1442831	Rape seed	P0401060A	1.86	20.46
UK	1442832	Wheat	P0500090A	10.00	120.00
UK	1442833	Wheat	P0500090A	2.00	18.00
UK	1442834	Non Crop Use	PXXXXXXA	0.00	0.00
			TOTAL	205.5	2332.8

(a): the area treated excludes seed treatments
(b): includes cumulative applications to the same field and the area of each product within a tank mix
(c): December 2014 download data

Table 47: PPP application data for the UK case study, sorted by field number and date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442801	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	1.08	0.06	0.06
1442801	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	1.08	1.04	1.04
1442801	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	1.08	0.06	0.06
1442801	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	1.08	0.47	0.16
1442801	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	1.08	0.47	0.31
1442801	Wheat	26/04/2013	Cherokee	HD	6	Propiconazole	UN	1.08	4.67	0.58
1442801	Wheat	26/04/2013	Cherokee	HD	6	Cyproconazole	UN	1.08	4.67	0.49
1442801	Wheat	26/04/2013	Cherokee	HD	6	Chlorothalonil	UN	1.08	4.67	3.60
1442801	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	1.08	3.63	2.73
1442801	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	1.08	3.63	0.91
1442801	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	1.08	6.10	3.63
1442801	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	1.08	6.10	2.47
1442801	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	1.08	5.97	4.48
1442801	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	1.08	5.97	1.49
1442801	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	1.08	0.65	0.65
1442801	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	1.08	1.95	1.95
1442801	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	1.08	0.28	0.04
1442801	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	1.08	0.28	0.24
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	1.08	3.63	1.04
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	1.08	3.63	1.17
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	1.08	3.63	1.43
1442801	Wheat	19/06/2013	Prosaro	HD	9	Tebuconazole	UN	1.08	0.78	0.39
1442801	Wheat	19/06/2013	Prosaro	HD	9	Prothioconazole	UN	1.08	0.78	0.39
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	1.08	0.91	0.26
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	1.08	0.91	0.29

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	1.08	0.91	0.36
1442802	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.68	0.82	0.82
1442802	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.68	0.82	0.82
1442802	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.68	1.54	1.54
1442802	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.68	0.06	0.06
1442802	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.68	1.52	1.03
1442802	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.68	1.52	0.49
1442802	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.68	5.58	5.58
1442802	Rape seed	15/04/2013	Galera	HD	6	Picloram	UN	0.68	0.92	0.17
1442802	Rape seed	15/04/2013	Galera	HD	6	Clopyralid	UN	0.68	0.92	0.75
1442802	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.68	0.06	0.06
1442802	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.68	0.82	0.82
1442802	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.68	0.99	0.49
1442802	Rape seed	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.68	0.99	0.49
1442803	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.41	5.85	5.85
1442803	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.41	2.06	1.03
1442803	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.41	2.06	1.03
1442803	Sugar beet	06/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.41	0.44	0.44
1442803	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Desmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Phenmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.41	0.62	0.58
1442803	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.41	0.62	0.04
1442803	Sugar beet	31/05/2013	Goltix Flowable	HD	6	Metamitron	UN	0.41	2.05	2.05
1442803	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Lenacil	UN	0.41	0.62	0.58
1442803	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Triflusulfuron-Methyl	UN	0.41	0.62	0.04

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442803	Sugar beet	31/05/2013	Teamforce	HD	6	Ethofumesate	UN	0.41	2.11	1.17
1442803	Sugar beet	31/05/2013	Teamforce	HD	6	Phenmedipham	UN	0.41	2.11	0.94
1442803	Sugar beet	07/06/2013	Betanal Turbo	HD	7	Desmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	07/06/2013	Betanal Turbo	HD	7	Phenmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	07/06/2013	Goltix Flowable	HD	7	Metamitron	UN	0.41	2.05	2.05
1442804	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.59	0.35	0.35
1442804	Wheat	30/04/2013	Hatra	HD	3	Iodosulfuron-methyl [a]	UN	0.59	0.26	0.09
1442804	Wheat	30/04/2013	Hatra	HD	3	Mesosulfuron	UN	0.59	0.26	0.17
1442804	Wheat	05/05/2013	Chord	HD	4	Boscalid	UN	0.59	1.99	1.49
1442804	Wheat	05/05/2013	Chord	HD	4	Epoxiconazole	UN	0.59	1.99	0.50
1442804	Wheat	05/05/2013	Guru	HD	4	Chlorothalonil	UN	0.59	3.34	1.99
1442804	Wheat	05/05/2013	Guru	HD	4	Mancozeb	UN	0.59	3.34	1.35
1442804	Wheat	05/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.59	3.27	2.45
1442804	Wheat	05/05/2013	Stronghold	HD	4	Mepiquat	UN	0.59	3.27	0.82
1442804	Wheat	05/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.59	0.36	0.36
1442804	Wheat	01/06/2013	Gala	HD	5	Fluroxypyr	UN	0.59	1.06	1.06
1442804	Wheat	01/06/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.59	0.16	0.02
1442804	Wheat	01/06/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.59	0.16	0.13
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Bixafen	UN	0.59	1.99	0.57
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Tebuconazole	UN	0.59	1.99	0.64
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Prothioconazole	UN	0.59	1.99	0.78
1442804	Wheat	16/06/2013	Prosaro	HD	6	Tebuconazole	UN	0.59	0.43	0.21
1442804	Wheat	16/06/2013	Prosaro	HD	6	Prothioconazole	UN	0.59	0.43	0.21
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Bixafen	UN	0.59	0.50	0.14
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Tebuconazole	UN	0.59	0.50	0.16
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Prothioconazole	UN	0.59	0.50	0.20

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442805	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.66	0.03	0.03
1442805	Barley	16/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.46	0.03	0.03
1442805	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	0.46	0.18	0.18
1442805	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.46	1.50	1.14
1442805	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.46	1.50	0.36
1442805	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.46	0.72	0.36
1442805	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.46	0.72	0.36
1442805	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.46	2.76	2.07
1442805	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.46	2.76	0.69
1442805	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.46	0.15	0.15
1442805	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.46	0.75	0.57
1442805	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.46	0.75	0.18
1442805	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.46	0.72	0.72
1442805	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.46	0.18	0.03
1442805	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.46	0.18	0.15
1442805	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.46	0.29	0.14
1442805	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.46	0.29	0.14
1442805	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	0.46	3.78	3.78
1442806	Wheat	04/05/2013	Chord	HD	2	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	04/05/2013	Chord	HD	2	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	04/05/2013	Justice	HD	2	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	25/05/2013	Chord	HD	3	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	25/05/2013	Chord	HD	3	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	25/05/2013	Gala	HD	3	Fluroxypyr	UN	0.52	0.68	0.68
1442806	Wheat	25/05/2013	Guru	HD	3	Chlorothalonil	UN	0.52	3.17	1.89

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442806	Wheat	25/05/2013	Guru	HD	3	Mancozeb	UN	0.52	3.17	1.28
1442806	Wheat	25/05/2013	Justice	HD	3	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	25/05/2013	New 5C Cycocel	HD	3	Chlormequat	UN	0.52	3.92	3.92
1442806	Wheat	25/05/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.52	0.15	0.02
1442806	Wheat	25/05/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.52	0.15	0.12
1442806	Wheat	25/05/2013	Tempo	HD	3	Trinexapac-Ethyl	UN	0.52	0.17	0.17
1442806	Wheat	16/06/2013	Justice	HD	4	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.52	1.89	0.54
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.52	1.89	0.61
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.52	1.89	0.74
1442806	Wheat	17/06/2013	Topik	HD	5	Clodinafop-propargyl	UN	0.52	0.20	0.20
1442806	Wheat	01/07/2013	Prosaro	HD	6	Tebuconazole	UN	0.52	0.81	0.40
1442806	Wheat	01/07/2013	Prosaro	HD	6	Prothioconazole	UN	0.52	0.81	0.40
1442806	Wheat	04/05/2013	Chord	HD	2	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	04/05/2013	Chord	HD	2	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	04/05/2013	Justice	HD	2	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	25/05/2013	Chord	HD	3	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	25/05/2013	Chord	HD	3	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	25/05/2013	Gala	HD	3	Fluroxypyr	UN	0.52	0.68	0.68
1442806	Wheat	25/05/2013	Guru	HD	3	Chlorothalonil	UN	0.52	3.17	1.89
1442806	Wheat	25/05/2013	Guru	HD	3	Mancozeb	UN	0.52	3.17	1.28
1442806	Wheat	25/05/2013	Justice	HD	3	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	25/05/2013	New 5C Cycocel	HD	3	Chlormequat	UN	0.52	3.92	3.92
1442806	Wheat	25/05/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.52	0.15	0.02
1442806	Wheat	25/05/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.52	0.15	0.12
1442806	Wheat	25/05/2013	Tempo	HD	3	Trinexapac-Ethyl	UN	0.52	0.17	0.17
1442806	Wheat	16/06/2013	Justice	HD	4	Proquinazid	UN	0.52	0.11	0.11

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.52	1.89	0.54
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.52	1.89	0.61
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.52	1.89	0.74
1442806	Wheat	17/06/2013	Topik	HD	5	Clodinafop-propargyl	UN	0.52	0.20	0.20
1442806	Wheat	01/07/2013	Prosaro	HD	6	Tebuconazole	UN	0.52	0.81	0.40
1442806	Wheat	01/07/2013	Prosaro	HD	6	Prothioconazole	UN	0.52	0.81	0.40
1442807	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.33	4.43	4.43
1442807	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.33	1.42	0.71
1442807	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.33	1.42	0.71
1442807	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.33	0.47	0.44
1442807	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.33	0.47	0.03
1442807	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.33	1.55	1.55
1442807	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.33	0.61	0.57
1442807	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.33	0.61	0.04
1442807	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.33	0.80	0.44
1442807	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.33	0.80	0.35
1442807	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.33	1.04	1.04
1442807	Sugar beet	14/06/2013	Dow Shield	HD	5	Clopyralid	UN	0.33	0.20	0.20
1442807	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.33	0.47	0.44
1442807	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.33	0.47	0.03
1442807	Sugar beet	18/06/2013	Fusilade 250 EW	HD	6	Fluazifop-P-butyl	UN	0.33	0.66	0.66
1442808	Wheat	20/02/2013	Dursban 4	HD	2	Chlorpyrifos	UN	0.77	5.43	5.43
1442808	Wheat	20/04/2013	Hatra	HD	3	Iodosulfuron-methyl [a]	UN	0.77	0.41	0.14
1442808	Wheat	20/04/2013	Hatra	HD	3	Mesosulfuron	UN	0.77	0.41	0.27
1442808	Wheat	26/04/2013	Cherokee	HD	4	Propiconazole	UN	0.77	4.08	0.51
1442808	Wheat	26/04/2013	Cherokee	HD	4	Cyproconazole	UN	0.77	4.08	0.42

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442808	Wheat	26/04/2013	Cherokee	HD	4	Chlorothalonil	UN	0.77	4.08	3.14
1442808	Wheat	10/05/2013	Chord	HD	5	Boscalid	UN	0.77	3.17	2.38
1442808	Wheat	10/05/2013	Chord	HD	5	Epoxiconazole	UN	0.77	3.17	0.79
1442808	Wheat	10/05/2013	Guru	HD	5	Chlorothalonil	UN	0.77	5.32	3.17
1442808	Wheat	10/05/2013	Guru	HD	5	Mancozeb	UN	0.77	5.32	2.15
1442808	Wheat	10/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.77	5.21	3.91
1442808	Wheat	10/05/2013	Stronghold	HD	5	Mepiquat	UN	0.77	5.21	1.30
1442808	Wheat	10/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.77	0.57	0.57
1442808	Wheat	03/06/2013	Gala	HD	6	Fluroxypyr	UN	0.77	1.70	1.70
1442808	Wheat	03/06/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.77	0.25	0.04
1442808	Wheat	03/06/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.77	0.25	0.21
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Bixafen	UN	0.77	3.17	0.91
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Tebuconazole	UN	0.77	3.17	1.02
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Prothioconazole	UN	0.77	3.17	1.25
1442808	Wheat	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.77	0.68	0.34
1442808	Wheat	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.77	0.68	0.34
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.77	0.79	0.23
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.77	0.79	0.25
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.77	0.79	0.31
1442809	Barley	06/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.4	0.02	0.02
1442809	Barley	25/10/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.4	0.02	0.02
1442809	Barley	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.4	0.02	0.02
1442809	Barley	01/05/2013	Axial	HD	5	Pinoxaden	UN	0.4	0.14	0.14
1442809	Barley	01/05/2013	Bontima	HD	5	Cyprodinil	UN	0.4	1.20	0.91
1442809	Barley	01/05/2013	Bontima	HD	5	Isopyrazam	UN	0.4	1.20	0.29

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442809	Barley	01/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.4	0.58	0.29
1442809	Barley	01/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.4	0.58	0.29
1442809	Barley	01/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.4	2.21	1.66
1442809	Barley	01/05/2013	Stronghold	HD	5	Mepiquat	UN	0.4	2.21	0.55
1442809	Barley	01/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.4	0.12	0.12
1442809	Barley	11/05/2013	Bontima	HD	6	Cyprodinil	UN	0.4	0.60	0.46
1442809	Barley	11/05/2013	Bontima	HD	6	Isopyrazam	UN	0.4	0.60	0.14
1442809	Barley	11/05/2013	Gala	HD	6	Fluroxypyr	UN	0.4	0.58	0.58
1442809	Barley	11/05/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.4	0.14	0.02
1442809	Barley	11/05/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.4	0.14	0.12
1442809	Barley	11/05/2013	Prosaro	HD	6	Tebuconazole	UN	0.4	0.23	0.12
1442809	Barley	11/05/2013	Prosaro	HD	6	Prothioconazole	UN	0.4	0.23	0.12
1442810	Wheat	04/05/2013	Chord	HD	2	Boscalid	UN	0.49	1.65	1.24
1442810	Wheat	04/05/2013	Chord	HD	2	Epoxiconazole	UN	0.49	1.65	0.41
1442810	Wheat	04/05/2013	Justice	HD	2	Proquinazid	UN	0.49	0.09	0.09
1442810	Wheat	25/05/2013	Chord	HD	3	Boscalid	UN	0.49	1.65	1.24
1442810	Wheat	25/05/2013	Chord	HD	3	Epoxiconazole	UN	0.49	1.65	0.41
1442810	Wheat	25/05/2013	Gala	HD	3	Fluroxypyr	UN	0.49	0.59	0.59
1442810	Wheat	25/05/2013	Guru	HD	3	Chlorothalonil	UN	0.49	2.77	1.65
1442810	Wheat	25/05/2013	Guru	HD	3	Mancozeb	UN	0.49	2.77	1.12
1442810	Wheat	25/05/2013	Justice	HD	3	Proquinazid	UN	0.49	0.09	0.09
1442810	Wheat	25/05/2013	New 5C Cycocel	HD	3	Chlormequat	UN	0.49	3.42	3.42
1442810	Wheat	25/05/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.49	0.13	0.02
1442810	Wheat	25/05/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.49	0.13	0.11
1442810	Wheat	25/05/2013	Tempo	HD	3	Trinexapac-Ethyl	UN	0.49	0.15	0.15
1442810	Wheat	16/06/2013	Justice	HD	4	Proquinazid	UN	0.49	0.09	0.09
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.49	1.65	0.47

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.49	1.65	0.53
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.49	1.65	0.65
1442810	Wheat	17/06/2013	Topik	HD	5	Clodinafop-propargyl	UN	0.49	0.18	0.18
1442810	Wheat	01/07/2013	Prosaro	HD	6	Tebuconazole	UN	0.49	0.71	0.35
1442810	Wheat	01/07/2013	Prosaro	HD	6	Prothioconazole	UN	0.49	0.71	0.35
1442811	Barley	29/10/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442811	Barley	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442811	Barley	01/05/2013	Bontima	HD	5	Cyprodinil	UN	0.33	0.99	0.75
1442811	Barley	01/05/2013	Bontima	HD	5	Isopyrazam	UN	0.33	0.99	0.24
1442811	Barley	01/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.33	0.47	0.24
1442811	Barley	01/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.33	0.47	0.24
1442811	Barley	01/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.33	1.82	1.36
1442811	Barley	01/05/2013	Stronghold	HD	5	Mepiquat	UN	0.33	1.82	0.45
1442811	Barley	01/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.33	0.10	0.10
1442811	Barley	11/05/2013	Bontima	HD	6	Cyprodinil	UN	0.33	0.49	0.38
1442811	Barley	11/05/2013	Bontima	HD	6	Isopyrazam	UN	0.33	0.49	0.12
1442811	Barley	11/05/2013	Gala	HD	6	Fluroxypyr	UN	0.33	0.47	0.47
1442811	Barley	11/05/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.33	0.12	0.02
1442811	Barley	11/05/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.33	0.12	0.10
1442811	Barley	11/05/2013	Prosaro	HD	6	Tebuconazole	UN	0.33	0.19	0.09
1442811	Barley	11/05/2013	Prosaro	HD	6	Prothioconazole	UN	0.33	0.19	0.09
1442812	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	0.75	0.04	0.04
1442812	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.75	0.58	0.58
1442812	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.75	0.04	0.04
1442812	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.75	0.26	0.09

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442812	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.75	0.26	0.17
1442812	Wheat	05/05/2013	Chord	HD	7	Boscalid	UN	0.75	2.02	1.51
1442812	Wheat	05/05/2013	Chord	HD	7	Epoxiconazole	UN	0.75	2.02	0.50
1442812	Wheat	05/05/2013	Guru	HD	7	Chlorothalonil	UN	0.75	3.38	2.02
1442812	Wheat	05/05/2013	Guru	HD	7	Mancozeb	UN	0.75	3.38	1.37
1442812	Wheat	05/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.75	3.31	2.48
1442812	Wheat	05/05/2013	Stronghold	HD	7	Mepiquat	UN	0.75	3.31	0.83
1442812	Wheat	05/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.75	0.36	0.36
1442812	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.75	1.08	1.08
1442812	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.75	0.16	0.02
1442812	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.75	0.16	0.13
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.75	2.02	0.58
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.75	2.02	0.65
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.75	2.02	0.79
1442812	Wheat	16/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.75	0.43	0.22
1442812	Wheat	16/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.75	0.43	0.22
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.75	0.50	0.14
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.75	0.50	0.16
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.75	0.50	0.20
1442813	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.44	0.80	0.80
1442813	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.44	0.03	0.03
1442813	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.44	0.79	0.53
1442813	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.44	0.79	0.25
1442813	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.44	2.89	2.89
1442813	Rape seed	12/04/2013	Galera	HD	6	Picloram	UN	0.44	0.48	0.09
1442813	Rape seed	12/04/2013	Galera	HD	6	Clopyralid	UN	0.44	0.48	0.39

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442813	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.44	0.03	0.03
1442813	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.44	0.43	0.43
1442813	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.44	0.51	0.26
1442813	Rape seed	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.44	0.51	0.26
1442814	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.42	5.02	5.02
1442814	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.42	1.61	0.80
1442814	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.42	1.61	0.80
1442814	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.42	0.53	0.50
1442814	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.42	0.53	0.04
1442814	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.42	1.76	1.76
1442814	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.42	0.69	0.64
1442814	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.42	0.69	0.05
1442814	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.42	0.90	0.50
1442814	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.42	0.90	0.40
1442814	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.42	1.18	1.18
1442814	Sugar beet	14/06/2013	Dow Shield	HD	5	Clopyralid	UN	0.42	0.23	0.23
1442814	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.42	0.53	0.50
1442814	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.42	0.53	0.04
1442815	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.41	0.58	0.58
1442815	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.41	1.09	1.09
1442815	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.41	0.04	0.04
1442815	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.41	1.08	0.73
1442815	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.41	1.08	0.35
1442815	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.41	3.96	3.96
1442815	Rape seed	13/04/2013	Galera	HD	6	Picloram	UN	0.41	0.65	0.12

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442815	Rape seed	13/04/2013	Galera	HD	6	Clopyralid	UN	0.41	0.65	0.53
1442815	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.41	0.04	0.04
1442815	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.41	0.58	0.58
1442815	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.41	0.70	0.35
1442816	Wheat	02/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.27	0.38	0.38
1442816	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.27	0.03	0.03
1442816	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.27	0.01	0.01
1442816	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.27	0.10	0.03
1442816	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.27	0.10	0.06
1442816	Wheat	10/05/2013	Chord	HD	6	Boscalid	UN	0.27	0.75	0.56
1442816	Wheat	10/05/2013	Chord	HD	6	Epoxiconazole	UN	0.27	0.75	0.19
1442816	Wheat	10/05/2013	Guru	HD	6	Chlorothalonil	UN	0.27	1.26	0.75
1442816	Wheat	10/05/2013	Guru	HD	6	Mancozeb	UN	0.27	1.26	0.51
1442816	Wheat	10/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.27	1.24	0.93
1442816	Wheat	10/05/2013	Stronghold	HD	6	Mepiquat	UN	0.27	1.24	0.31
1442816	Wheat	10/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.27	0.13	0.13
1442816	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.27	0.40	0.40
1442816	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.27	0.06	0.01
1442816	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.27	0.06	0.05
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.27	0.75	0.22
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.27	0.75	0.24
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.27	0.75	0.30
1442816	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.27	0.16	0.08
1442816	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.27	0.16	0.08
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.27	0.19	0.05

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.27	0.19	0.06
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.27	0.19	0.07
1442817	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.55	0.07	0.07
1442817	Wheat	29/10/2012	Hallmark With Zeon Technology	HD	9	Lambda-Cyhalothrin	UN	0.55	0.02	0.02
1442817	Wheat	14/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.55	0.04	0.04
1442817	Wheat	20/02/2013	Dursban 4	HD	10	Chlorpyrifos	UN	0.55	3.42	3.42
1442817	Wheat	30/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.55	0.26	0.09
1442817	Wheat	30/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.55	0.26	0.17
1442817	Wheat	07/05/2013	Chord	HD	6	Boscalid	UN	0.55	1.99	1.50
1442817	Wheat	07/05/2013	Chord	HD	6	Epoxiconazole	UN	0.55	1.99	0.50
1442817	Wheat	07/05/2013	Guru	HD	6	Chlorothalonil	UN	0.55	3.35	1.99
1442817	Wheat	07/05/2013	Guru	HD	6	Mancozeb	UN	0.55	3.35	1.35
1442817	Wheat	07/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.55	3.28	2.46
1442817	Wheat	07/05/2013	Stronghold	HD	6	Mepiquat	UN	0.55	3.28	0.82
1442817	Wheat	07/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.55	0.36	0.36
1442817	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.55	1.07	1.07
1442817	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.55	0.16	0.02
1442817	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.55	0.16	0.13
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.55	1.99	0.57
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.55	1.99	0.64
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.55	1.99	0.78
1442817	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.55	0.43	0.21
1442817	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.55	0.43	0.21
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.55	0.50	0.14
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.55	0.50	0.16

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.55	0.50	0.20
1442818	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.62	0.08	0.08
1442818	Wheat	14/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.62	0.04	0.04
1442818	Wheat	30/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.62	0.29	0.10
1442818	Wheat	30/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.62	0.29	0.19
1442818	Wheat	07/05/2013	Chord	HD	6	Boscalid	UN	0.62	2.24	1.68
1442818	Wheat	07/05/2013	Chord	HD	6	Epoxiconazole	UN	0.62	2.24	0.56
1442818	Wheat	07/05/2013	Guru	HD	6	Chlorothalonil	UN	0.62	3.76	2.24
1442818	Wheat	07/05/2013	Guru	HD	6	Mancozeb	UN	0.62	3.76	1.52
1442818	Wheat	07/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.62	3.68	2.76
1442818	Wheat	07/05/2013	Stronghold	HD	6	Mepiquat	UN	0.62	3.68	0.92
1442818	Wheat	07/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.62	0.40	0.40
1442818	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.62	1.20	1.20
1442818	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.62	0.17	0.03
1442818	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.62	0.17	0.15
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.62	2.24	0.64
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.62	2.24	0.72
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.62	2.24	0.88
1442818	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.62	0.48	0.24
1442818	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.62	0.48	0.24
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.62	0.56	0.16
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.62	0.56	0.18
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.62	0.56	0.22
1442819	Rape seed	05/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.42	0.51	0.51
1442819	Rape seed	06/10/2012	Fusilade 250 EW	HD	3	Fluazifop-P-butyl	UN	0.42	0.96	0.96
1442819	Rape seed	11/11/2012	Hallmark With Zeon	HD	4	Lambda-Cyhalothrin	UN	0.42	0.04	0.04

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
			Technology							
1442819	Rape seed	11/11/2012	Harvesan	HD	4	Flusilazole	UN	0.42	0.95	0.64
1442819	Rape seed	11/11/2012	Harvesan	HD	4	Carbendazim	UN	0.42	0.95	0.31
1442819	Rape seed	11/11/2012	Kerb Flo	HD	4	Propyzamide	UN	0.42	3.48	3.48
1442819	Rape seed	12/04/2013	Clayton Belstone	HD	5	Bifenox	UN	0.42	1.47	1.47
1442819	Rape seed	12/04/2013	Galera	HD	5	Picloram	UN	0.42	0.57	0.11
1442819	Rape seed	12/04/2013	Galera	HD	5	Clopyralid	UN	0.42	0.57	0.47
1442819	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.42	0.04	0.04
1442819	Rape seed	19/06/2013	Priori Xtra	HD	6	Azoxystrobin	UN	0.42	0.51	0.51
1442819	Rape seed	19/06/2013	Prosaro	HD	6	Tebuconazole	UN	0.42	0.61	0.31
1442819	Rape seed	19/06/2013	Prosaro	HD	6	Prothioconazole	UN	0.42	0.61	0.31
1442820	Wheat	02/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.5	0.98	0.98
1442820	Wheat	17/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.5	0.07	0.07
1442820	Wheat	26/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.5	0.56	0.56
1442820	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.5	0.04	0.04
1442820	Wheat	20/04/2013	Hatra	HD	6	Iodosulfuron-methyl [a]	UN	0.5	0.25	0.08
1442820	Wheat	20/04/2013	Hatra	HD	6	Mesosulfuron	UN	0.5	0.25	0.17
1442820	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	0.5	1.96	1.47
1442820	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	0.5	1.96	0.49
1442820	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	0.5	3.29	1.96
1442820	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	0.5	3.29	1.33
1442820	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.5	3.22	2.42
1442820	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	0.5	3.22	0.81
1442820	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.5	0.35	0.35
1442820	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.5	1.05	1.05

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442820	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.5	0.15	0.02
1442820	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.5	0.15	0.13
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.5	1.96	0.56
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.5	1.96	0.63
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.5	1.96	0.77
1442820	Wheat	17/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.5	0.42	0.21
1442820	Wheat	17/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.5	0.42	0.21
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.5	0.49	0.14
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.5	0.49	0.16
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.5	0.49	0.19
1442821	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442821	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442821	Barley	08/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442821	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.26	0.64	0.48
1442821	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.26	0.64	0.15
1442821	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.26	0.31	0.15
1442821	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.26	0.31	0.15
1442821	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.26	1.17	0.88
1442821	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.26	1.17	0.29
1442821	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.26	0.06	0.06
1442821	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.26	0.32	0.24
1442821	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.26	0.32	0.08
1442821	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.26	0.31	0.31
1442821	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.26	0.07	0.01
1442821	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.26	0.07	0.06

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442821	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.26	0.12	0.06
1442821	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.26	0.12	0.06
1442821	Barley	18/07/2013	Roundup	HD	6	Glyphosate	UN	0.26	1.61	1.61
1442822	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.23	2.30	2.30
1442822	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.23	0.74	0.37
1442822	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.23	0.74	0.37
1442822	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.23	0.24	0.23
1442822	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.23	0.24	0.02
1442822	Sugar beet	31/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.23	0.17	0.17
1442822	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.23	0.54	0.54
1442822	Sugar beet	14/06/2013	Goltix Flowable	HD	5	Metamitron	UN	0.23	0.80	0.80
1442822	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.23	0.24	0.23
1442822	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.23	0.24	0.02
1442823	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442823	Barley	17/10/2012	Lexus SX	HD	8	Flupyrsulfuron-methyl	UN	0.33	0.04	0.04
1442823	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442823	Barley	16/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442823	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	0.33	0.12	0.12
1442823	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.33	1.00	0.76
1442823	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.33	1.00	0.24
1442823	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.33	0.48	0.24
1442823	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.33	0.48	0.24
1442823	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.33	1.84	1.38
1442823	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.33	1.84	0.46
1442823	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.33	0.10	0.10

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442823	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.33	0.50	0.38
1442823	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.33	0.50	0.12
1442823	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.33	0.48	0.48
1442823	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.33	0.12	0.02
1442823	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.33	0.12	0.10
1442823	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.33	0.19	0.10
1442823	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.33	0.19	0.10
1442823	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	0.33	2.52	2.52
1442824	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.31	3.71	3.71
1442824	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.31	1.31	0.65
1442824	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.31	1.31	0.65
1442824	Sugar beet	06/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.31	0.28	0.28
1442824	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Desmedipham	UN	0.31	1.19	0.59
1442824	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Phenmedipham	UN	0.31	1.19	0.59
1442824	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.31	0.39	0.37
1442824	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.31	0.39	0.03
1442824	Sugar beet	31/05/2013	Goltix Flowable	HD	6	Metamitron	UN	0.31	1.30	1.30
1442824	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Lenacil	UN	0.31	0.39	0.37
1442824	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Triflusulfuron-Methyl	UN	0.31	0.39	0.03
1442824	Sugar beet	31/05/2013	Teamforce	HD	6	Ethofumesate	UN	0.31	1.34	0.74
1442824	Sugar beet	31/05/2013	Teamforce	HD	6	Phenmedipham	UN	0.31	1.34	0.59
1442825	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.5	0.70	0.70
1442825	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.5	1.31	1.31
1442825	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442825	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.5	1.30	0.88
1442825	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.5	1.30	0.42

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442825	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.5	4.76	4.76
1442825	Rape seed	13/04/2013	Galera	HD	6	Picloram	UN	0.5	0.78	0.15
1442825	Rape seed	13/04/2013	Galera	HD	6	Clopyralid	UN	0.5	0.78	0.64
1442825	Rape seed	17/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442825	Rape seed	17/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.5	0.70	0.70
1442825	Rape seed	17/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.5	0.84	0.42
1442825	Rape seed	17/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.5	0.84	0.42
1442826	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	1	0.05	0.05
1442826	Barley	17/10/2012	Lexus SX	HD	8	Flupyrsulfuron-methyl	UN	1	0.11	0.11
1442826	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	1	0.06	0.06
1442826	Barley	16/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	1	0.06	0.06
1442826	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	1	0.33	0.33
1442826	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	1	2.75	2.09
1442826	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	1	2.75	0.66
1442826	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	1	1.32	0.66
1442826	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	1	1.32	0.66
1442826	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	1	5.06	3.80
1442826	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	1	5.06	1.27
1442826	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	1	0.28	0.28
1442826	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	1	1.38	1.04
1442826	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	1	1.38	0.33
1442826	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	1	1.32	1.32
1442826	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	1	0.32	0.05
1442826	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	1	0.32	0.27

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442826	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	1	0.53	0.26
1442826	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	1	0.53	0.26
1442826	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	1	6.93	6.93
1442827	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	0.7	0.04	0.04
1442827	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.7	0.67	0.67
1442827	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.7	0.04	0.04
1442827	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.7	0.30	0.10
1442827	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.7	0.30	0.20
1442827	Wheat	26/04/2013	Cherokee	HD	6	Propiconazole	UN	0.7	3.02	0.38
1442827	Wheat	26/04/2013	Cherokee	HD	6	Cyproconazole	UN	0.7	3.02	0.31
1442827	Wheat	26/04/2013	Cherokee	HD	6	Chlorothalonil	UN	0.7	3.02	2.33
1442827	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	0.7	2.35	1.76
1442827	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	0.7	2.35	0.59
1442827	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	0.7	3.95	2.35
1442827	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	0.7	3.95	1.60
1442827	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.7	3.86	2.90
1442827	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	0.7	3.86	0.97
1442827	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.7	0.42	0.42
1442827	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.7	1.26	1.26
1442827	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.7	0.18	0.03
1442827	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.7	0.18	0.16
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.7	2.35	0.67
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.7	2.35	0.76
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.7	2.35	0.92
1442827	Wheat	16/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.7	0.50	0.25
1442827	Wheat	16/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.7	0.50	0.25

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.7	0.59	0.17
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.7	0.59	0.19
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.7	0.59	0.23
1442828	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.75	7.50	7.50
1442828	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.75	2.40	1.20
1442828	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.75	2.40	1.20
1442828	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.75	0.80	0.75
1442828	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.75	0.80	0.05
1442828	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.75	2.63	2.63
1442828	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.75	1.03	0.96
1442828	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.75	1.03	0.07
1442828	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.75	1.35	0.75
1442828	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.75	1.35	0.60
1442829	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.5	0.60	0.60
1442829	Rape seed	10/09/2012	Aramo	HD	3	Tepraloxydim	UN	0.5	0.30	0.30
1442829	Rape seed	05/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.5	0.60	0.60
1442829	Rape seed	06/10/2012	Crawler	HD	5	Carbetamide	UN	0.5	5.40	5.40
1442829	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442829	Rape seed	11/11/2012	Harvesan	HD	6	Flusilazole	UN	0.5	1.11	0.75
1442829	Rape seed	11/11/2012	Harvesan	HD	6	Carbendazim	UN	0.5	1.11	0.36
1442829	Rape seed	11/11/2012	Kerb Flo	HD	6	Propyzamide	UN	0.5	4.08	4.08
1442829	Rape seed	12/04/2013	Dow Shield	HD	7	Clopyralid	UN	0.5	0.27	0.27
1442829	Rape seed	05/06/2013	Hallmark With Zeon Technology	HD	8	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442829	Rape seed	05/06/2013	Priori Xtra	HD	8	Azoxystrobin	UN	0.5	0.60	0.60
1442829	Rape seed	05/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.5	0.72	0.36

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442829	Rape seed	05/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.5	0.72	0.36
1442830	Sugar beet	09/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.88	9.65	9.65
1442830	Sugar beet	31/05/2013	Goltix Flowable	HD	3	Metamitron	UN	0.88	3.38	3.38
1442830	Sugar beet	31/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.88	1.32	1.23
1442830	Sugar beet	31/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.88	1.32	0.09
1442830	Sugar beet	31/05/2013	Teamforce	HD	3	Ethofumesate	UN	0.88	1.74	0.97
1442830	Sugar beet	31/05/2013	Teamforce	HD	3	Phenmedipham	UN	0.88	1.74	0.77
1442830	Sugar beet	04/06/2013	Aramo	HD	4	Tepraloxydim	UN	0.88	0.72	0.72
1442830	Sugar beet	16/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.88	1.03	0.96
1442830	Sugar beet	16/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.88	1.03	0.07
1442830	Sugar beet	16/06/2013	Corzal	HD	6	Phenmedipham	UN	0.88	2.27	2.27
1442830	Sugar beet	16/06/2013	Dow Shield	HD	6	Clopyralid	UN	0.88	0.43	0.43
1442831	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.16	0.19	0.19
1442831	Rape seed	10/09/2012	Aramo	HD	3	Tepraloxydim	UN	0.16	0.09	0.09
1442831	Rape seed	05/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.16	0.19	0.19
1442831	Rape seed	06/10/2012	Crawler	HD	5	Carbetamide	UN	0.16	1.67	1.67
1442831	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.16	0.01	0.01
1442831	Rape seed	11/11/2012	Harvesan	HD	6	Flusilazole	UN	0.16	0.34	0.23
1442831	Rape seed	11/11/2012	Harvesan	HD	6	Carbendazim	UN	0.16	0.34	0.11
1442831	Rape seed	11/11/2012	Kerb Flo	HD	6	Propyzamide	UN	0.16	1.26	1.26
1442831	Rape seed	15/04/2013	Galera	HD	10	Picloram	UN	0.16	0.21	0.04
1442831	Rape seed	15/04/2013	Galera	HD	10	Clopyralid	UN	0.16	0.21	0.17
1442831	Rape seed	05/06/2013	Hallmark With Zeon Technology	HD	8	Lambda-Cyhalothrin	UN	0.16	0.01	0.01
1442831	Rape seed	05/06/2013	Priori Xtra	HD	8	Azoxystrobin	UN	0.16	0.19	0.19
1442831	Rape seed	05/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.16	0.22	0.11

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442831	Rape seed	05/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.16	0.22	0.11
1442832	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.83	0.80	0.80
1442832	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.83	0.05	0.05
1442832	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.83	0.36	0.12
1442832	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.83	0.36	0.24
1442832	Wheat	05/05/2013	Chord	HD	7	Boscalid	UN	0.83	2.80	2.10
1442832	Wheat	05/05/2013	Chord	HD	7	Epoxiconazole	UN	0.83	2.80	0.70
1442832	Wheat	05/05/2013	Guru	HD	7	Chlorothalonil	UN	0.83	4.70	2.80
1442832	Wheat	05/05/2013	Guru	HD	7	Mancozeb	UN	0.83	4.70	1.90
1442832	Wheat	05/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.83	4.60	3.45
1442832	Wheat	05/05/2013	Stronghold	HD	7	Mepiquat	UN	0.83	4.60	1.15
1442832	Wheat	05/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.83	0.50	0.50
1442832	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.83	1.50	1.50
1442832	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.83	0.22	0.03
1442832	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.83	0.22	0.18
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.83	2.80	0.80
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.83	2.80	0.90
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.83	2.80	1.10
1442832	Wheat	17/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.83	0.60	0.30
1442832	Wheat	17/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.83	0.60	0.30
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.83	0.70	0.20
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.83	0.70	0.22
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.83	0.70	0.27
1442833	Wheat	07/05/2013	Chord	HD	2	Boscalid	UN	0.42	0.56	0.42
1442833	Wheat	07/05/2013	Chord	HD	2	Epoxiconazole	UN	0.42	0.56	0.14
1442833	Wheat	07/05/2013	Guru	HD	2	Chlorothalonil	UN	0.42	0.94	0.56

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442833	Wheat	07/05/2013	Guru	HD	2	Mancozeb	UN	0.42	0.94	0.38
1442833	Wheat	07/05/2013	Stronghold	HD	2	Chlormequat chloride	UN	0.42	0.92	0.69
1442833	Wheat	07/05/2013	Stronghold	HD	2	Mepiquat	UN	0.42	0.92	0.23
1442833	Wheat	07/05/2013	Tempo	HD	2	Trinexapac-Ethyl	UN	0.42	0.10	0.10
1442833	Wheat	01/06/2013	Gala	HD	3	Fluroxypyr	UN	0.42	0.30	0.30
1442833	Wheat	01/06/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.42	0.04	0.01
1442833	Wheat	01/06/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.42	0.04	0.04
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Bixafen	UN	0.42	0.56	0.16
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Tebuconazole	UN	0.42	0.56	0.18
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Prothioconazole	UN	0.42	0.56	0.22
1442833	Wheat	17/06/2013	Prosaro	HD	4	Tebuconazole	UN	0.42	0.12	0.06
1442833	Wheat	17/06/2013	Prosaro	HD	4	Prothioconazole	UN	0.42	0.12	0.06
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.42	0.14	0.04
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.42	0.14	0.04
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.42	0.14	0.05
1442834	Non Crop Use	10/07/2013	K Obiol EC 25	KN	1	Deltamethrin (cis-deltamethrin)	UN	0.5	3.75	3.75
1442834	Non Crop Use	10/07/2013	K Obiol EC 25	KN	2	Deltamethrin (cis-deltamethrin)	UN	0.5	3.75	3.75
1442834	Non Crop Use	(null)	Glyphosate	KN	3	Glyphosate	UN	0.08	0.18	0.18
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	4	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	5	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	6	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	7	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	8	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	9	Brodifacoum	UN	1	0.00002	0.00002

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	10	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	11	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	12	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	13	Brodifacoum	UN	1	0.00002	0.00002

(a): iodosulfuron-methyl including salts, expressed as iodosulfuron-methyl
(b): December 2014 download data

Table 48: PPP application data for the UK case study, sorted by date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442802	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.68	0.82	0.82
1442829	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.5	0.60	0.60
1442831	Rape seed	25/08/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.16	0.19	0.19
1442829	Rape seed	10/09/2012	Aramo	HD	3	Tepraloxydim	UN	0.5	0.30	0.30
1442831	Rape seed	10/09/2012	Aramo	HD	3	Tepraloxydim	UN	0.16	0.09	0.09
1442816	Wheat	02/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.27	0.38	0.38
1442820	Wheat	02/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.5	0.98	0.98
1442802	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.68	0.82	0.82
1442815	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.41	0.58	0.58
1442819	Rape seed	05/10/2012	Decoy Wetex	MB	2	Methiocarb	UN	0.42	0.51	0.51
1442825	Rape seed	05/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.5	0.70	0.70
1442829	Rape seed	05/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.5	0.60	0.60
1442831	Rape seed	05/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.16	0.19	0.19
1442802	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.68	1.54	1.54
1442809	Barley	06/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.4	0.02	0.02
1442813	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.44	0.80	0.80
1442815	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.41	1.09	1.09
1442819	Rape seed	06/10/2012	Fusilade 250 EW	HD	3	Fluazifop-P-butyl	UN	0.42	0.96	0.96
1442821	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442823	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442825	Rape seed	06/10/2012	Fusilade 250 EW	HD	4	Fluazifop-P-butyl	UN	0.5	1.31	1.31
1442826	Barley	06/10/2012	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	1	0.05	0.05
1442829	Rape seed	06/10/2012	Crawler	HD	5	Carbetamide	UN	0.5	5.40	5.40

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442831	Rape seed	06/10/2012	Crawler	HD	5	Carbetamide	UN	0.16	1.67	1.67
1442801	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	1.08	0.06	0.06
1442812	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	0.75	0.04	0.04
1442820	Wheat	17/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.5	0.07	0.07
1442823	Barley	17/10/2012	Lexus SX	HD	8	Flupyrsulfuron-methyl	UN	0.33	0.04	0.04
1442826	Barley	17/10/2012	Lexus SX	HD	8	Flupyrsulfuron-methyl	UN	1	0.11	0.11
1442827	Wheat	17/10/2012	Lexus SX	HD	2	Flupyrsulfuron-methyl	UN	0.7	0.04	0.04
1442805	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.66	0.03	0.03
1442809	Barley	25/10/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.4	0.02	0.02
1442821	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442823	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442826	Barley	25/10/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	1	0.06	0.06
1442801	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	1.08	1.04	1.04
1442812	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.75	0.58	0.58
1442820	Wheat	26/10/2012	Decoy Wetex	MB	4	Methiocarb	UN	0.5	0.56	0.56
1442827	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.7	0.67	0.67
1442832	Wheat	26/10/2012	Decoy Wetex	MB	3	Methiocarb	UN	0.83	0.80	0.80
1442816	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.27	0.03	0.03
1442817	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.55	0.07	0.07
1442818	Wheat	27/10/2012	Lexus SX	HD	3	Flupyrsulfuron-methyl	UN	0.62	0.08	0.08
1442811	Barley	29/10/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442817	Wheat	29/10/2012	Hallmark With Zeon Technology	HD	9	Lambda-Cyhalothrin	UN	0.55	0.02	0.02
1442809	Barley	08/11/2012	Hallmark With Zeon	HD	4	Lambda-Cyhalothrin	UN	0.4	0.02	0.02

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
			Technology							
1442811	Barley	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442812	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.75	0.04	0.04
1442816	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.27	0.01	0.01
1442821	Barley	08/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.26	0.01	0.01
1442827	Wheat	08/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.7	0.04	0.04
1442802	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.68	0.06	0.06
1442802	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.68	1.52	1.03
1442802	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.68	1.52	0.49
1442802	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.68	5.58	5.58
1442813	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.44	0.03	0.03
1442813	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.44	0.79	0.53
1442813	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.44	0.79	0.25
1442813	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.44	2.89	2.89
1442815	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.41	0.04	0.04
1442815	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.41	1.08	0.73
1442815	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.41	1.08	0.35
1442815	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.41	3.96	3.96
1442819	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.42	0.04	0.04
1442819	Rape seed	11/11/2012	Harvesan	HD	4	Flusilazole	UN	0.42	0.95	0.64
1442819	Rape seed	11/11/2012	Harvesan	HD	4	Carbendazim	UN	0.42	0.95	0.31
1442819	Rape seed	11/11/2012	Kerb Flo	HD	4	Propyzamide	UN	0.42	3.48	3.48

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442825	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442825	Rape seed	11/11/2012	Harvesan	HD	5	Flusilazole	UN	0.5	1.30	0.88
1442825	Rape seed	11/11/2012	Harvesan	HD	5	Carbendazim	UN	0.5	1.30	0.42
1442825	Rape seed	11/11/2012	Kerb Flo	HD	5	Propyzamide	UN	0.5	4.76	4.76
1442829	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442829	Rape seed	11/11/2012	Harvesan	HD	6	Flusilazole	UN	0.5	1.11	0.75
1442829	Rape seed	11/11/2012	Harvesan	HD	6	Carbendazim	UN	0.5	1.11	0.36
1442829	Rape seed	11/11/2012	Kerb Flo	HD	6	Propyzamide	UN	0.5	4.08	4.08
1442831	Rape seed	11/11/2012	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.16	0.01	0.01
1442831	Rape seed	11/11/2012	Harvesan	HD	6	Flusilazole	UN	0.16	0.34	0.23
1442831	Rape seed	11/11/2012	Harvesan	HD	6	Carbendazim	UN	0.16	0.34	0.11
1442831	Rape seed	11/11/2012	Kerb Flo	HD	6	Propyzamide	UN	0.16	1.26	1.26
1442801	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	1.08	0.06	0.06
1442804	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	2	Lambda-Cyhalothrin	UN	0.59	0.35	0.35
1442820	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	5	Lambda-Cyhalothrin	UN	0.5	0.04	0.04
1442832	Wheat	13/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.83	0.05	0.05
1442817	Wheat	14/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.55	0.04	0.04
1442818	Wheat	14/11/2012	Hallmark With Zeon Technology	HD	4	Lambda-Cyhalothrin	UN	0.62	0.04	0.04
1442805	Barley	16/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.46	0.03	0.03
1442823	Barley	16/11/2012	Hallmark With Zeon Technology	HD	3	Lambda-Cyhalothrin	UN	0.33	0.02	0.02
1442826	Barley	16/11/2012	Hallmark With Zeon	HD	3	Lambda-Cyhalothrin	UN	1	0.06	0.06

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
			Technology							
1442808	Wheat	20/02/2013	Dursban 4	HD	2	Chlorpyrifos	UN	0.77	5.43	5.43
1442817	Wheat	20/02/2013	Dursban 4	HD	10	Chlorpyrifos	UN	0.55	3.42	3.42
1442803	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.41	5.85	5.85
1442807	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.33	4.43	4.43
1442814	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.42	5.02	5.02
1442822	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.23	2.30	2.30
1442824	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.31	3.71	3.71
1442828	Sugar beet	06/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.75	7.50	7.50
1442830	Sugar beet	09/04/2013	Oblix 500	HD	2	Ethofumesate	UN	0.88	9.65	9.65
1442813	Rape seed	12/04/2013	Galera	HD	6	Picloram	UN	0.44	0.48	0.09
1442813	Rape seed	12/04/2013	Galera	HD	6	Clopyralid	UN	0.44	0.48	0.39
1442819	Rape seed	12/04/2013	Clayton Belstone	HD	5	Bifenox	UN	0.42	1.47	1.47
1442819	Rape seed	12/04/2013	Galera	HD	5	Picloram	UN	0.42	0.57	0.11
1442819	Rape seed	12/04/2013	Galera	HD	5	Clopyralid	UN	0.42	0.57	0.47
1442829	Rape seed	12/04/2013	Dow Shield	HD	7	Clopyralid	UN	0.5	0.27	0.27
1442815	Rape seed	13/04/2013	Galera	HD	6	Picloram	UN	0.41	0.65	0.12
1442815	Rape seed	13/04/2013	Galera	HD	6	Clopyralid	UN	0.41	0.65	0.53
1442825	Rape seed	13/04/2013	Galera	HD	6	Picloram	UN	0.5	0.78	0.15
1442825	Rape seed	13/04/2013	Galera	HD	6	Clopyralid	UN	0.5	0.78	0.64
1442802	Rape seed	15/04/2013	Galera	HD	6	Picloram	UN	0.68	0.92	0.17
1442802	Rape seed	15/04/2013	Galera	HD	6	Clopyralid	UN	0.68	0.92	0.75
1442831	Rape seed	15/04/2013	Galera	HD	10	Picloram	UN	0.16	0.21	0.04
1442831	Rape seed	15/04/2013	Galera	HD	10	Clopyralid	UN	0.16	0.21	0.17
1442801	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	1.08	0.47	0.16
1442801	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	1.08	0.47	0.31
1442808	Wheat	20/04/2013	Hatra	HD	3	Iodosulfuron-methyl [a]	UN	0.77	0.41	0.14

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442808	Wheat	20/04/2013	Hatra	HD	3	Mesosulfuron	UN	0.77	0.41	0.27
1442812	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.75	0.26	0.09
1442812	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.75	0.26	0.17
1442816	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.27	0.10	0.03
1442816	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.27	0.10	0.06
1442820	Wheat	20/04/2013	Hatra	HD	6	Iodosulfuron-methyl [a]	UN	0.5	0.25	0.08
1442820	Wheat	20/04/2013	Hatra	HD	6	Mesosulfuron	UN	0.5	0.25	0.17
1442827	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.7	0.30	0.10
1442827	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.7	0.30	0.20
1442832	Wheat	20/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.83	0.36	0.12
1442832	Wheat	20/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.83	0.36	0.24
1442801	Wheat	26/04/2013	Cherokee	HD	6	Propiconazole	UN	1.08	4.67	0.58
1442801	Wheat	26/04/2013	Cherokee	HD	6	Cyproconazole	UN	1.08	4.67	0.49
1442801	Wheat	26/04/2013	Cherokee	HD	6	Chlorothalonil	UN	1.08	4.67	3.60
1442808	Wheat	26/04/2013	Cherokee	HD	4	Propiconazole	UN	0.77	4.08	0.51
1442808	Wheat	26/04/2013	Cherokee	HD	4	Cyproconazole	UN	0.77	4.08	0.42
1442808	Wheat	26/04/2013	Cherokee	HD	4	Chlorothalonil	UN	0.77	4.08	3.14
1442827	Wheat	26/04/2013	Cherokee	HD	6	Propiconazole	UN	0.7	3.02	0.38
1442827	Wheat	26/04/2013	Cherokee	HD	6	Cyproconazole	UN	0.7	3.02	0.31
1442827	Wheat	26/04/2013	Cherokee	HD	6	Chlorothalonil	UN	0.7	3.02	2.33
1442804	Wheat	30/04/2013	Hatra	HD	3	Iodosulfuron-methyl [a]	UN	0.59	0.26	0.09
1442804	Wheat	30/04/2013	Hatra	HD	3	Mesosulfuron	UN	0.59	0.26	0.17
1442817	Wheat	30/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.55	0.26	0.09
1442817	Wheat	30/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.55	0.26	0.17
1442818	Wheat	30/04/2013	Hatra	HD	5	Iodosulfuron-methyl [a]	UN	0.62	0.29	0.10
1442818	Wheat	30/04/2013	Hatra	HD	5	Mesosulfuron	UN	0.62	0.29	0.19
1442805	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	0.46	0.18	0.18

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442805	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.46	1.50	1.14
1442805	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.46	1.50	0.36
1442805	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.46	0.72	0.36
1442805	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.46	0.72	0.36
1442805	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.46	2.76	2.07
1442805	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.46	2.76	0.69
1442805	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.46	0.15	0.15
1442809	Barley	01/05/2013	Axial	HD	5	Pinoxaden	UN	0.4	0.14	0.14
1442809	Barley	01/05/2013	Bontima	HD	5	Cyprodinil	UN	0.4	1.20	0.91
1442809	Barley	01/05/2013	Bontima	HD	5	Isopyrazam	UN	0.4	1.20	0.29
1442809	Barley	01/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.4	0.58	0.29
1442809	Barley	01/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.4	0.58	0.29
1442809	Barley	01/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.4	2.21	1.66
1442809	Barley	01/05/2013	Stronghold	HD	5	Mepiquat	UN	0.4	2.21	0.55
1442809	Barley	01/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.4	0.12	0.12
1442811	Barley	01/05/2013	Bontima	HD	5	Cyprodinil	UN	0.33	0.99	0.75
1442811	Barley	01/05/2013	Bontima	HD	5	Isopyrazam	UN	0.33	0.99	0.24
1442811	Barley	01/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.33	0.47	0.24
1442811	Barley	01/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.33	0.47	0.24
1442811	Barley	01/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.33	1.82	1.36
1442811	Barley	01/05/2013	Stronghold	HD	5	Mepiquat	UN	0.33	1.82	0.45
1442811	Barley	01/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.33	0.10	0.10
1442821	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.26	0.64	0.48
1442821	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.26	0.64	0.15
1442821	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.26	0.31	0.15
1442821	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.26	0.31	0.15
1442821	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.26	1.17	0.88

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442821	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.26	1.17	0.29
1442821	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.26	0.06	0.06
1442823	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	0.33	0.12	0.12
1442823	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	0.33	1.00	0.76
1442823	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	0.33	1.00	0.24
1442823	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	0.33	0.48	0.24
1442823	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	0.33	0.48	0.24
1442823	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.33	1.84	1.38
1442823	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	0.33	1.84	0.46
1442823	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.33	0.10	0.10
1442826	Barley	01/05/2013	Axial	HD	4	Pinoxaden	UN	1	0.33	0.33
1442826	Barley	01/05/2013	Bontima	HD	4	Cyprodinil	UN	1	2.75	2.09
1442826	Barley	01/05/2013	Bontima	HD	4	Isopyrazam	UN	1	2.75	0.66
1442826	Barley	01/05/2013	Prosaro	HD	4	Tebuconazole	UN	1	1.32	0.66
1442826	Barley	01/05/2013	Prosaro	HD	4	Prothioconazole	UN	1	1.32	0.66
1442826	Barley	01/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	1	5.06	3.80
1442826	Barley	01/05/2013	Stronghold	HD	4	Mepiquat	UN	1	5.06	1.27
1442826	Barley	01/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	1	0.28	0.28
1442803	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.41	2.06	1.03
1442803	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.41	2.06	1.03
1442824	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.31	1.31	0.65
1442824	Sugar beet	02/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.31	1.31	0.65
1442806	Wheat	04/05/2013	Chord	HD	2	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	04/05/2013	Chord	HD	2	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	04/05/2013	Justice	HD	2	Proquinazid	UN	0.52	0.11	0.11
1442810	Wheat	04/05/2013	Chord	HD	2	Boscalid	UN	0.49	1.65	1.24
1442810	Wheat	04/05/2013	Chord	HD	2	Epoxiconazole	UN	0.49	1.65	0.41

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442810	Wheat	04/05/2013	Justice	HD	2	Proquinazid	UN	0.49	0.09	0.09
1442804	Wheat	05/05/2013	Chord	HD	4	Boscalid	UN	0.59	1.99	1.49
1442804	Wheat	05/05/2013	Chord	HD	4	Epoxiconazole	UN	0.59	1.99	0.50
1442804	Wheat	05/05/2013	Guru	HD	4	Chlorothalonil	UN	0.59	3.34	1.99
1442804	Wheat	05/05/2013	Guru	HD	4	Mancozeb	UN	0.59	3.34	1.35
1442804	Wheat	05/05/2013	Stronghold	HD	4	Chlormequat chloride	UN	0.59	3.27	2.45
1442804	Wheat	05/05/2013	Stronghold	HD	4	Mepiquat	UN	0.59	3.27	0.82
1442804	Wheat	05/05/2013	Tempo	HD	4	Trinexapac-Ethyl	UN	0.59	0.36	0.36
1442812	Wheat	05/05/2013	Chord	HD	7	Boscalid	UN	0.75	2.02	1.51
1442812	Wheat	05/05/2013	Chord	HD	7	Epoxiconazole	UN	0.75	2.02	0.50
1442812	Wheat	05/05/2013	Guru	HD	7	Chlorothalonil	UN	0.75	3.38	2.02
1442812	Wheat	05/05/2013	Guru	HD	7	Mancozeb	UN	0.75	3.38	1.37
1442812	Wheat	05/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.75	3.31	2.48
1442812	Wheat	05/05/2013	Stronghold	HD	7	Mepiquat	UN	0.75	3.31	0.83
1442812	Wheat	05/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.75	0.36	0.36
1442832	Wheat	05/05/2013	Chord	HD	7	Boscalid	UN	0.83	2.80	2.10
1442832	Wheat	05/05/2013	Chord	HD	7	Epoxiconazole	UN	0.83	2.80	0.70
1442832	Wheat	05/05/2013	Guru	HD	7	Chlorothalonil	UN	0.83	4.70	2.80
1442832	Wheat	05/05/2013	Guru	HD	7	Mancozeb	UN	0.83	4.70	1.90
1442832	Wheat	05/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.83	4.60	3.45
1442832	Wheat	05/05/2013	Stronghold	HD	7	Mepiquat	UN	0.83	4.60	1.15
1442832	Wheat	05/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.83	0.50	0.50
1442803	Sugar beet	06/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.41	0.44	0.44
1442824	Sugar beet	06/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.31	0.28	0.28
1442801	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	1.08	3.63	2.73
1442801	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	1.08	3.63	0.91
1442801	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	1.08	6.10	3.63

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442801	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	1.08	6.10	2.47
1442801	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	1.08	5.97	4.48
1442801	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	1.08	5.97	1.49
1442801	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	1.08	0.65	0.65
1442817	Wheat	07/05/2013	Chord	HD	6	Boscalid	UN	0.55	1.99	1.50
1442817	Wheat	07/05/2013	Chord	HD	6	Epoxiconazole	UN	0.55	1.99	0.50
1442817	Wheat	07/05/2013	Guru	HD	6	Chlorothalonil	UN	0.55	3.35	1.99
1442817	Wheat	07/05/2013	Guru	HD	6	Mancozeb	UN	0.55	3.35	1.35
1442817	Wheat	07/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.55	3.28	2.46
1442817	Wheat	07/05/2013	Stronghold	HD	6	Mepiquat	UN	0.55	3.28	0.82
1442817	Wheat	07/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.55	0.36	0.36
1442818	Wheat	07/05/2013	Chord	HD	6	Boscalid	UN	0.62	2.24	1.68
1442818	Wheat	07/05/2013	Chord	HD	6	Epoxiconazole	UN	0.62	2.24	0.56
1442818	Wheat	07/05/2013	Guru	HD	6	Chlorothalonil	UN	0.62	3.76	2.24
1442818	Wheat	07/05/2013	Guru	HD	6	Mancozeb	UN	0.62	3.76	1.52
1442818	Wheat	07/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.62	3.68	2.76
1442818	Wheat	07/05/2013	Stronghold	HD	6	Mepiquat	UN	0.62	3.68	0.92
1442818	Wheat	07/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.62	0.40	0.40
1442820	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	0.5	1.96	1.47
1442820	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	0.5	1.96	0.49
1442820	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	0.5	3.29	1.96
1442820	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	0.5	3.29	1.33
1442820	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.5	3.22	2.42
1442820	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	0.5	3.22	0.81
1442820	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.5	0.35	0.35
1442827	Wheat	07/05/2013	Chord	HD	7	Boscalid	UN	0.7	2.35	1.76
1442827	Wheat	07/05/2013	Chord	HD	7	Epoxiconazole	UN	0.7	2.35	0.59

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442827	Wheat	07/05/2013	Guru	HD	7	Chlorothalonil	UN	0.7	3.95	2.35
1442827	Wheat	07/05/2013	Guru	HD	7	Mancozeb	UN	0.7	3.95	1.60
1442827	Wheat	07/05/2013	Stronghold	HD	7	Chlormequat chloride	UN	0.7	3.86	2.90
1442827	Wheat	07/05/2013	Stronghold	HD	7	Mepiquat	UN	0.7	3.86	0.97
1442827	Wheat	07/05/2013	Tempo	HD	7	Trinexapac-Ethyl	UN	0.7	0.42	0.42
1442833	Wheat	07/05/2013	Chord	HD	2	Boscalid	UN	0.42	0.56	0.42
1442833	Wheat	07/05/2013	Chord	HD	2	Epoxiconazole	UN	0.42	0.56	0.14
1442833	Wheat	07/05/2013	Guru	HD	2	Chlorothalonil	UN	0.42	0.94	0.56
1442833	Wheat	07/05/2013	Guru	HD	2	Mancozeb	UN	0.42	0.94	0.38
1442833	Wheat	07/05/2013	Stronghold	HD	2	Chlormequat chloride	UN	0.42	0.92	0.69
1442833	Wheat	07/05/2013	Stronghold	HD	2	Mepiquat	UN	0.42	0.92	0.23
1442833	Wheat	07/05/2013	Tempo	HD	2	Trinexapac-Ethyl	UN	0.42	0.10	0.10
1442808	Wheat	10/05/2013	Chord	HD	5	Boscalid	UN	0.77	3.17	2.38
1442808	Wheat	10/05/2013	Chord	HD	5	Epoxiconazole	UN	0.77	3.17	0.79
1442808	Wheat	10/05/2013	Guru	HD	5	Chlorothalonil	UN	0.77	5.32	3.17
1442808	Wheat	10/05/2013	Guru	HD	5	Mancozeb	UN	0.77	5.32	2.15
1442808	Wheat	10/05/2013	Stronghold	HD	5	Chlormequat chloride	UN	0.77	5.21	3.91
1442808	Wheat	10/05/2013	Stronghold	HD	5	Mepiquat	UN	0.77	5.21	1.30
1442808	Wheat	10/05/2013	Tempo	HD	5	Trinexapac-Ethyl	UN	0.77	0.57	0.57
1442816	Wheat	10/05/2013	Chord	HD	6	Boscalid	UN	0.27	0.75	0.56
1442816	Wheat	10/05/2013	Chord	HD	6	Epoxiconazole	UN	0.27	0.75	0.19
1442816	Wheat	10/05/2013	Guru	HD	6	Chlorothalonil	UN	0.27	1.26	0.75
1442816	Wheat	10/05/2013	Guru	HD	6	Mancozeb	UN	0.27	1.26	0.51
1442816	Wheat	10/05/2013	Stronghold	HD	6	Chlormequat chloride	UN	0.27	1.24	0.93
1442816	Wheat	10/05/2013	Stronghold	HD	6	Mepiquat	UN	0.27	1.24	0.31
1442816	Wheat	10/05/2013	Tempo	HD	6	Trinexapac-Ethyl	UN	0.27	0.13	0.13
1442809	Barley	11/05/2013	Bontima	HD	6	Cyprodinil	UN	0.4	0.60	0.46

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442809	Barley	11/05/2013	Bontima	HD	6	Isopyrazam	UN	0.4	0.60	0.14
1442809	Barley	11/05/2013	Gala	HD	6	Fluroxypyr	UN	0.4	0.58	0.58
1442809	Barley	11/05/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.4	0.14	0.02
1442809	Barley	11/05/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.4	0.14	0.12
1442809	Barley	11/05/2013	Prosaro	HD	6	Tebuconazole	UN	0.4	0.23	0.12
1442809	Barley	11/05/2013	Prosaro	HD	6	Prothioconazole	UN	0.4	0.23	0.12
1442811	Barley	11/05/2013	Bontima	HD	6	Cyprodinil	UN	0.33	0.49	0.38
1442811	Barley	11/05/2013	Bontima	HD	6	Isopyrazam	UN	0.33	0.49	0.12
1442811	Barley	11/05/2013	Gala	HD	6	Fluroxypyr	UN	0.33	0.47	0.47
1442811	Barley	11/05/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.33	0.12	0.02
1442811	Barley	11/05/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.33	0.12	0.10
1442811	Barley	11/05/2013	Prosaro	HD	6	Tebuconazole	UN	0.33	0.19	0.09
1442811	Barley	11/05/2013	Prosaro	HD	6	Prothioconazole	UN	0.33	0.19	0.09
1442805	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.46	0.75	0.57
1442805	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.46	0.75	0.18
1442805	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.46	0.72	0.72
1442805	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.46	0.18	0.03
1442805	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.46	0.18	0.15
1442805	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.46	0.29	0.14
1442805	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.46	0.29	0.14
1442821	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.26	0.32	0.24
1442821	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.26	0.32	0.08
1442821	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.26	0.31	0.31
1442821	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.26	0.07	0.01
1442821	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.26	0.07	0.06
1442821	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.26	0.12	0.06
1442821	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.26	0.12	0.06

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442823	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	0.33	0.50	0.38
1442823	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	0.33	0.50	0.12
1442823	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	0.33	0.48	0.48
1442823	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.33	0.12	0.02
1442823	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.33	0.12	0.10
1442823	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	0.33	0.19	0.10
1442823	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	0.33	0.19	0.10
1442826	Barley	14/05/2013	Bontima	HD	5	Cyprodinil	UN	1	1.38	1.04
1442826	Barley	14/05/2013	Bontima	HD	5	Isopyrazam	UN	1	1.38	0.33
1442826	Barley	14/05/2013	Gala	HD	5	Fluroxypyr	UN	1	1.32	1.32
1442826	Barley	14/05/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	1	0.32	0.05
1442826	Barley	14/05/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	1	0.32	0.27
1442826	Barley	14/05/2013	Prosaro	HD	5	Tebuconazole	UN	1	0.53	0.26
1442826	Barley	14/05/2013	Prosaro	HD	5	Prothioconazole	UN	1	0.53	0.26
1442803	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Desmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Phenmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.41	0.62	0.58
1442803	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.41	0.62	0.04
1442807	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.33	1.42	0.71
1442807	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.33	1.42	0.71
1442807	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.33	0.47	0.44
1442807	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.33	0.47	0.03
1442814	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.42	1.61	0.80
1442814	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.42	1.61	0.80
1442814	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.42	0.53	0.50
1442814	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.42	0.53	0.04
1442822	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.23	0.74	0.37

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442822	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.23	0.74	0.37
1442822	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.23	0.24	0.23
1442822	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.23	0.24	0.02
1442824	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Desmedipham	UN	0.31	1.19	0.59
1442824	Sugar beet	16/05/2013	Betanal Maxxim	HD	5	Phenmedipham	UN	0.31	1.19	0.59
1442824	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.31	0.39	0.37
1442824	Sugar beet	16/05/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.31	0.39	0.03
1442828	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Desmedipham	UN	0.75	2.40	1.20
1442828	Sugar beet	16/05/2013	Betanal Maxxim	HD	3	Phenmedipham	UN	0.75	2.40	1.20
1442828	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.75	0.80	0.75
1442828	Sugar beet	16/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.75	0.80	0.05
1442806	Wheat	25/05/2013	Chord	HD	3	Boscalid	UN	0.52	1.89	1.42
1442806	Wheat	25/05/2013	Chord	HD	3	Epoxiconazole	UN	0.52	1.89	0.47
1442806	Wheat	25/05/2013	Gala	HD	3	Fluroxypyr	UN	0.52	0.68	0.68
1442806	Wheat	25/05/2013	Guru	HD	3	Chlorothalonil	UN	0.52	3.17	1.89
1442806	Wheat	25/05/2013	Guru	HD	3	Mancozeb	UN	0.52	3.17	1.28
1442806	Wheat	25/05/2013	Justice	HD	3	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	25/05/2013	New 5C Cycocel	HD	3	Chlormequat	UN	0.52	3.92	3.92
1442806	Wheat	25/05/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.52	0.15	0.02
1442806	Wheat	25/05/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.52	0.15	0.12
1442806	Wheat	25/05/2013	Tempo	HD	3	Trinexapac-Ethyl	UN	0.52	0.17	0.17
1442810	Wheat	25/05/2013	Chord	HD	3	Boscalid	UN	0.49	1.65	1.24
1442810	Wheat	25/05/2013	Chord	HD	3	Epoxiconazole	UN	0.49	1.65	0.41
1442810	Wheat	25/05/2013	Gala	HD	3	Fluroxypyr	UN	0.49	0.59	0.59
1442810	Wheat	25/05/2013	Guru	HD	3	Chlorothalonil	UN	0.49	2.77	1.65
1442810	Wheat	25/05/2013	Guru	HD	3	Mancozeb	UN	0.49	2.77	1.12
1442810	Wheat	25/05/2013	Justice	HD	3	Proquinazid	UN	0.49	0.09	0.09

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442810	Wheat	25/05/2013	New 5C Cycocel	HD	3	Chlormequat	UN	0.49	3.42	3.42
1442810	Wheat	25/05/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.49	0.13	0.02
1442810	Wheat	25/05/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.49	0.13	0.11
1442810	Wheat	25/05/2013	Tempo	HD	3	Trinexapac-Ethyl	UN	0.49	0.15	0.15
1442803	Sugar beet	31/05/2013	Goltix Flowable	HD	6	Metamitron	UN	0.41	2.05	2.05
1442803	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Lenacil	UN	0.41	0.62	0.58
1442803	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Triflusulfuron-Methyl	UN	0.41	0.62	0.04
1442803	Sugar beet	31/05/2013	Teamforce	HD	6	Ethofumesate	UN	0.41	2.11	1.17
1442803	Sugar beet	31/05/2013	Teamforce	HD	6	Phenmedipham	UN	0.41	2.11	0.94
1442807	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.33	1.55	1.55
1442807	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.33	0.61	0.57
1442807	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.33	0.61	0.04
1442807	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.33	0.80	0.44
1442807	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.33	0.80	0.35
1442814	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.42	1.76	1.76
1442814	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.42	0.69	0.64
1442814	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.42	0.69	0.05
1442814	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.42	0.90	0.50
1442814	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.42	0.90	0.40
1442822	Sugar beet	31/05/2013	Aramo	HD	4	Tepraloxydim	UN	0.23	0.17	0.17
1442824	Sugar beet	31/05/2013	Goltix Flowable	HD	6	Metamitron	UN	0.31	1.30	1.30
1442824	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Lenacil	UN	0.31	0.39	0.37
1442824	Sugar beet	31/05/2013	Safari Lite WSB	HD	6	Triflusulfuron-Methyl	UN	0.31	0.39	0.03
1442824	Sugar beet	31/05/2013	Teamforce	HD	6	Ethofumesate	UN	0.31	1.34	0.74
1442824	Sugar beet	31/05/2013	Teamforce	HD	6	Phenmedipham	UN	0.31	1.34	0.59
1442828	Sugar beet	31/05/2013	Goltix Flowable	HD	4	Metamitron	UN	0.75	2.63	2.63
1442828	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Lenacil	UN	0.75	1.03	0.96

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442828	Sugar beet	31/05/2013	Safari Lite WSB	HD	4	Triflusulfuron-Methyl	UN	0.75	1.03	0.07
1442828	Sugar beet	31/05/2013	Teamforce	HD	4	Ethofumesate	UN	0.75	1.35	0.75
1442828	Sugar beet	31/05/2013	Teamforce	HD	4	Phenmedipham	UN	0.75	1.35	0.60
1442830	Sugar beet	31/05/2013	Goltix Flowable	HD	3	Metamitron	UN	0.88	3.38	3.38
1442830	Sugar beet	31/05/2013	Safari Lite WSB	HD	3	Lenacil	UN	0.88	1.32	1.23
1442830	Sugar beet	31/05/2013	Safari Lite WSB	HD	3	Triflusulfuron-Methyl	UN	0.88	1.32	0.09
1442830	Sugar beet	31/05/2013	Teamforce	HD	3	Ethofumesate	UN	0.88	1.74	0.97
1442830	Sugar beet	31/05/2013	Teamforce	HD	3	Phenmedipham	UN	0.88	1.74	0.77
1442801	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	1.08	1.95	1.95
1442801	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	1.08	0.28	0.04
1442801	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	1.08	0.28	0.24
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	1.08	3.63	1.04
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	1.08	3.63	1.17
1442801	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	1.08	3.63	1.43
1442804	Wheat	01/06/2013	Gala	HD	5	Fluroxypyr	UN	0.59	1.06	1.06
1442804	Wheat	01/06/2013	Presite SX	HD	5	Metsulfuron-methyl	UN	0.59	0.16	0.02
1442804	Wheat	01/06/2013	Presite SX	HD	5	Thifensulfuron-methyl	UN	0.59	0.16	0.13
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Bixafen	UN	0.59	1.99	0.57
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Tebuconazole	UN	0.59	1.99	0.64
1442804	Wheat	01/06/2013	Sparticus Xpro	HD	5	Prothioconazole	UN	0.59	1.99	0.78
1442812	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.75	1.08	1.08
1442812	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.75	0.16	0.02
1442812	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.75	0.16	0.13
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.75	2.02	0.58
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.75	2.02	0.65
1442812	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.75	2.02	0.79
1442816	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.27	0.40	0.40

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442816	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.27	0.06	0.01
1442816	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.27	0.06	0.05
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.27	0.75	0.22
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.27	0.75	0.24
1442816	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.27	0.75	0.30
1442817	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.55	1.07	1.07
1442817	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.55	0.16	0.02
1442817	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.55	0.16	0.13
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.55	1.99	0.57
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.55	1.99	0.64
1442817	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.55	1.99	0.78
1442818	Wheat	01/06/2013	Gala	HD	7	Fluroxypyr	UN	0.62	1.20	1.20
1442818	Wheat	01/06/2013	Presite SX	HD	7	Metsulfuron-methyl	UN	0.62	0.17	0.03
1442818	Wheat	01/06/2013	Presite SX	HD	7	Thifensulfuron-methyl	UN	0.62	0.17	0.15
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.62	2.24	0.64
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.62	2.24	0.72
1442818	Wheat	01/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.62	2.24	0.88
1442820	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.5	1.05	1.05
1442820	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.5	0.15	0.02
1442820	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.5	0.15	0.13
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.5	1.96	0.56
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.5	1.96	0.63
1442820	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.5	1.96	0.77
1442827	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.7	1.26	1.26
1442827	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.7	0.18	0.03
1442827	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.7	0.18	0.16
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.7	2.35	0.67

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.7	2.35	0.76
1442827	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.7	2.35	0.92
1442832	Wheat	01/06/2013	Gala	HD	8	Fluroxypyr	UN	0.83	1.50	1.50
1442832	Wheat	01/06/2013	Presite SX	HD	8	Metsulfuron-methyl	UN	0.83	0.22	0.03
1442832	Wheat	01/06/2013	Presite SX	HD	8	Thifensulfuron-methyl	UN	0.83	0.22	0.18
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.83	2.80	0.80
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.83	2.80	0.90
1442832	Wheat	01/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.83	2.80	1.10
1442833	Wheat	01/06/2013	Gala	HD	3	Fluroxypyr	UN	0.42	0.30	0.30
1442833	Wheat	01/06/2013	Presite SX	HD	3	Metsulfuron-methyl	UN	0.42	0.04	0.01
1442833	Wheat	01/06/2013	Presite SX	HD	3	Thifensulfuron-methyl	UN	0.42	0.04	0.04
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Bixafen	UN	0.42	0.56	0.16
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Tebuconazole	UN	0.42	0.56	0.18
1442833	Wheat	01/06/2013	Sparticus Xpro	HD	3	Prothioconazole	UN	0.42	0.56	0.22
1442808	Wheat	03/06/2013	Gala	HD	6	Fluroxypyr	UN	0.77	1.70	1.70
1442808	Wheat	03/06/2013	Presite SX	HD	6	Metsulfuron-methyl	UN	0.77	0.25	0.04
1442808	Wheat	03/06/2013	Presite SX	HD	6	Thifensulfuron-methyl	UN	0.77	0.25	0.21
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Bixafen	UN	0.77	3.17	0.91
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Tebuconazole	UN	0.77	3.17	1.02
1442808	Wheat	03/06/2013	Sparticus Xpro	HD	6	Prothioconazole	UN	0.77	3.17	1.25
1442830	Sugar beet	04/06/2013	Aramo	HD	4	Tepraloxydim	UN	0.88	0.72	0.72
1442829	Rape seed	05/06/2013	Hallmark With Zeon Technology	HD	8	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442829	Rape seed	05/06/2013	Priori Xtra	HD	8	Azoxystrobin	UN	0.5	0.60	0.60
1442829	Rape seed	05/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.5	0.72	0.36
1442829	Rape seed	05/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.5	0.72	0.36
1442831	Rape seed	05/06/2013	Hallmark With Zeon	HD	8	Lambda-Cyhalothrin	UN	0.16	0.01	0.01

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
			Technology							
1442831	Rape seed	05/06/2013	Priori Xtra	HD	8	Azoxystrobin	UN	0.16	0.19	0.19
1442831	Rape seed	05/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.16	0.22	0.11
1442831	Rape seed	05/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.16	0.22	0.11
1442803	Sugar beet	07/06/2013	Betanal Turbo	HD	7	Desmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	07/06/2013	Betanal Turbo	HD	7	Phenmedipham	UN	0.41	1.87	0.94
1442803	Sugar beet	07/06/2013	Goltix Flowable	HD	7	Metamitron	UN	0.41	2.05	2.05
1442807	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.33	1.04	1.04
1442807	Sugar beet	14/06/2013	Dow Shield	HD	5	Clopyralid	UN	0.33	0.20	0.20
1442807	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.33	0.47	0.44
1442807	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.33	0.47	0.03
1442814	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.42	1.18	1.18
1442814	Sugar beet	14/06/2013	Dow Shield	HD	5	Clopyralid	UN	0.42	0.23	0.23
1442814	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.42	0.53	0.50
1442814	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.42	0.53	0.04
1442822	Sugar beet	14/06/2013	Corzal	HD	5	Phenmedipham	UN	0.23	0.54	0.54
1442822	Sugar beet	14/06/2013	Goltix Flowable	HD	5	Metamitron	UN	0.23	0.80	0.80
1442822	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.23	0.24	0.23
1442822	Sugar beet	14/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.23	0.24	0.02
1442804	Wheat	16/06/2013	Prosaro	HD	6	Tebuconazole	UN	0.59	0.43	0.21
1442804	Wheat	16/06/2013	Prosaro	HD	6	Prothioconazole	UN	0.59	0.43	0.21
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Bixafen	UN	0.59	0.50	0.14
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Tebuconazole	UN	0.59	0.50	0.16
1442804	Wheat	16/06/2013	Sparticus Xpro	HD	6	Prothioconazole	UN	0.59	0.50	0.20
1442806	Wheat	16/06/2013	Justice	HD	4	Proquinazid	UN	0.52	0.11	0.11
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.52	1.89	0.54
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.52	1.89	0.61

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442806	Wheat	16/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.52	1.89	0.74
1442810	Wheat	16/06/2013	Justice	HD	4	Proquinazid	UN	0.49	0.09	0.09
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.49	1.65	0.47
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.49	1.65	0.53
1442810	Wheat	16/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.49	1.65	0.65
1442812	Wheat	16/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.75	0.43	0.22
1442812	Wheat	16/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.75	0.43	0.22
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.75	0.50	0.14
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.75	0.50	0.16
1442812	Wheat	16/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.75	0.50	0.20
1442827	Wheat	16/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.7	0.50	0.25
1442827	Wheat	16/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.7	0.50	0.25
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.7	0.59	0.17
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.7	0.59	0.19
1442827	Wheat	16/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.7	0.59	0.23
1442830	Sugar beet	16/06/2013	Safari Lite WSB	HD	5	Lenacil	UN	0.88	1.03	0.96
1442830	Sugar beet	16/06/2013	Safari Lite WSB	HD	5	Triflusulfuron-Methyl	UN	0.88	1.03	0.07
1442830	Sugar beet	16/06/2013	Corzal	HD	6	Phenmedipham	UN	0.88	2.27	2.27
1442830	Sugar beet	16/06/2013	Dow Shield	HD	6	Clopyralid	UN	0.88	0.43	0.43
1442806	Wheat	17/06/2013	Topik	HD	5	Clodinafop-propargyl	UN	0.52	0.20	0.20
1442810	Wheat	17/06/2013	Topik	HD	5	Clodinafop-propargyl	UN	0.49	0.18	0.18
1442816	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.27	0.16	0.08
1442816	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.27	0.16	0.08
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.27	0.19	0.05
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.27	0.19	0.06
1442816	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.27	0.19	0.07
1442817	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.55	0.43	0.21

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442817	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.55	0.43	0.21
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.55	0.50	0.14
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.55	0.50	0.16
1442817	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.55	0.50	0.20
1442818	Wheat	17/06/2013	Prosaro	HD	8	Tebuconazole	UN	0.62	0.48	0.24
1442818	Wheat	17/06/2013	Prosaro	HD	8	Prothioconazole	UN	0.62	0.48	0.24
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Bixafen	UN	0.62	0.56	0.16
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Tebuconazole	UN	0.62	0.56	0.18
1442818	Wheat	17/06/2013	Sparticus Xpro	HD	8	Prothioconazole	UN	0.62	0.56	0.22
1442820	Wheat	17/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.5	0.42	0.21
1442820	Wheat	17/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.5	0.42	0.21
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.5	0.49	0.14
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.5	0.49	0.16
1442820	Wheat	17/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.5	0.49	0.19
1442825	Rape seed	17/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.5	0.05	0.05
1442825	Rape seed	17/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.5	0.70	0.70
1442825	Rape seed	17/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.5	0.84	0.42
1442825	Rape seed	17/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.5	0.84	0.42
1442832	Wheat	17/06/2013	Prosaro	HD	9	Tebuconazole	UN	0.83	0.60	0.30
1442832	Wheat	17/06/2013	Prosaro	HD	9	Prothioconazole	UN	0.83	0.60	0.30
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	0.83	0.70	0.20
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	0.83	0.70	0.22
1442832	Wheat	17/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	0.83	0.70	0.27
1442833	Wheat	17/06/2013	Prosaro	HD	4	Tebuconazole	UN	0.42	0.12	0.06
1442833	Wheat	17/06/2013	Prosaro	HD	4	Prothioconazole	UN	0.42	0.12	0.06
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Bixafen	UN	0.42	0.14	0.04

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Tebuconazole	UN	0.42	0.14	0.04
1442833	Wheat	17/06/2013	Sparticus Xpro	HD	4	Prothioconazole	UN	0.42	0.14	0.05
1442807	Sugar beet	18/06/2013	Fusilade 250 EW	HD	6	Fluazifop-P-butyl	UN	0.33	0.66	0.66
1442801	Wheat	19/06/2013	Prosaro	HD	9	Tebuconazole	UN	1.08	0.78	0.39
1442801	Wheat	19/06/2013	Prosaro	HD	9	Prothioconazole	UN	1.08	0.78	0.39
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Bixafen	UN	1.08	0.91	0.26
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Tebuconazole	UN	1.08	0.91	0.29
1442801	Wheat	19/06/2013	Sparticus Xpro	HD	9	Prothioconazole	UN	1.08	0.91	0.36
1442802	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.68	0.06	0.06
1442802	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.68	0.82	0.82
1442802	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.68	0.99	0.49
1442802	Rape seed	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.68	0.99	0.49
1442808	Wheat	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.77	0.68	0.34
1442808	Wheat	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.77	0.68	0.34
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Bixafen	UN	0.77	0.79	0.23
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Tebuconazole	UN	0.77	0.79	0.25
1442808	Wheat	19/06/2013	Sparticus Xpro	HD	7	Prothioconazole	UN	0.77	0.79	0.31
1442813	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.44	0.03	0.03
1442813	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.44	0.43	0.43
1442813	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.44	0.51	0.26
1442813	Rape seed	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.44	0.51	0.26
1442815	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	7	Lambda-Cyhalothrin	UN	0.41	0.04	0.04
1442815	Rape seed	19/06/2013	Priori Xtra	HD	7	Azoxystrobin	UN	0.41	0.58	0.58
1442815	Rape seed	19/06/2013	Prosaro	HD	7	Tebuconazole	UN	0.41	0.70	0.35
1442815	Rape seed	19/06/2013	Prosaro	HD	7	Prothioconazole	UN	0.41	0.70	0.35

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442819	Rape seed	19/06/2013	Hallmark With Zeon Technology	HD	6	Lambda-Cyhalothrin	UN	0.42	0.04	0.04
1442819	Rape seed	19/06/2013	Priori Xtra	HD	6	Azoxystrobin	UN	0.42	0.51	0.51
1442819	Rape seed	19/06/2013	Prosaro	HD	6	Tebuconazole	UN	0.42	0.61	0.31
1442819	Rape seed	19/06/2013	Prosaro	HD	6	Prothioconazole	UN	0.42	0.61	0.31
1442806	Wheat	01/07/2013	Prosaro	HD	6	Tebuconazole	UN	0.52	0.81	0.40
1442806	Wheat	01/07/2013	Prosaro	HD	6	Prothioconazole	UN	0.52	0.81	0.40
1442810	Wheat	01/07/2013	Prosaro	HD	6	Tebuconazole	UN	0.49	0.71	0.35
1442810	Wheat	01/07/2013	Prosaro	HD	6	Prothioconazole	UN	0.49	0.71	0.35
1442834	Non Crop Use	10/07/2013	K Obiol EC 25	KN	1	Deltamethrin (cis-deltamethrin)	UN	0.5	3.75	3.75
1442834	Non Crop Use	10/07/2013	K Obiol EC 25	KN	2	Deltamethrin (cis-deltamethrin)	UN	0.5	3.75	3.75
1442821	Barley	18/07/2013	Roundup	HD	6	Glyphosate	UN	0.26	1.61	1.61
1442805	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	0.46	3.78	3.78
1442823	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	0.33	2.52	2.52
1442826	Barley	22/07/2013	Roundup	HD	6	Glyphosate	UN	1	6.93	6.93
1442834	Non Crop Use	(null)	Glyphosate	KN	3	Glyphosate	UN	0.08	0.18	0.18
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	4	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	5	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	6	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	7	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	8	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	9	Brodifacoum	UN	1	0.00002	0.00002
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	10	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	11	Brodifacoum	UN	1	0.00002	0.00002

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
1442834	Non Crop Use	(null)	Neosorexa Bait Blocks	VC	12	Difenacoum	UN	1	0.00005	0.00005
1442834	Non Crop Use	(null)	Jaguar Blox	VC	13	Brodifacoum	UN	1	0.00002	0.00002

(a): iodosulfuron-methyl including salts, expressed as iodosulfuron-methyl
(b): December 2014 download data

Table 49: Details of the time the principal spray operator spent applying PPPs per crop in chronological order for the UK case study (Forms 3)

crop	m_app	actdate	sum(nhours) per crop	sum(nhours) per day
Non Crop Use	KN	(null)	0.08	10.08
Non Crop Use	VC	(null)	10	-
Rape seed	MB	25/08/2012	1.34	1.34
Rape seed	HD	10/09/2012	0.66	0.66
Wheat	MB	02/10/2012	0.77	0.77
Rape seed	MB	05/10/2012	2.67	2.67
Rape seed	HD	06/10/2012	3.11	5.1
Barley	HD	06/10/2012	1.99	-
Barley	HD	17/10/2012	1.33	4.36
Wheat	HD	17/10/2012	3.03	-
Barley	HD	25/10/2012	2.65	2.65
Wheat	MB	26/10/2012	3.86	3.86
Wheat	HD	27/10/2012	1.44	1.44
Wheat	HD	29/10/2012	0.55	0.88
Barley	HD	29/10/2012	0.33	-
Barley	HD	08/11/2012	0.99	2.71
Wheat	HD	08/11/2012	1.72	-
Rape seed	HD	11/11/2012	3.11	3.11
Wheat	HD	13/11/2012	3	3
Wheat	HD	14/11/2012	1.17	1.17
Barley	HD	16/11/2012	1.79	1.79
Wheat	HD	20/02/2013	1.32	1.32
Sugar beet	HD	06/04/2013	2.45	2.45
Sugar beet	HD	09/04/2013	0.88	0.88
Rape seed	HD	12/04/2013	1.36	1.36
Rape seed	HD	13/04/2013	0.91	0.91
Rape seed	HD	15/04/2013	0.84	0.84
Wheat	HD	20/04/2013	4.9	4.9
Wheat	HD	26/04/2013	2.55	2.55
Wheat	HD	30/04/2013	1.76	1.76
Barley	HD	01/05/2013	2.78	2.78
Sugar beet	HD	02/05/2013	0.72	0.72
Wheat	HD	04/05/2013	1.01	1.01
Wheat	HD	05/05/2013	2.17	2.17
Sugar beet	HD	06/05/2013	0.72	0.72
Wheat	HD	07/05/2013	3.87	3.87
Wheat	HD	10/05/2013	1.04	1.04
Barley	HD	11/05/2013	0.73	0.73
Barley	HD	14/05/2013	2.05	2.05

crop	m_app	actdate	sum(nhours) per crop	sum(nhours) per day
Sugar beet	HD	16/05/2013	2.45	2.45
Wheat	HD	25/05/2013	1.01	1.01
Sugar beet	HD	31/05/2013	3.33	3.33
Wheat	HD	01/06/2013	6.31	6.31
Wheat	HD	03/06/2013	0.77	0.77
Sugar beet	HD	04/06/2013	0.88	0.88
Rape seed	HD	05/06/2013	0.66	0.66
Sugar beet	HD	07/06/2013	0.41	0.41
Sugar beet	HD	14/06/2013	0.98	0.98
Sugar beet	HD	16/06/2013	1.76	4.81
Wheat	HD	16/06/2013	3.05	-
Rape seed	HD	17/06/2013	0.5	4.7
Wheat	HD	17/06/2013	4.2	-
Sugar beet	HD	18/06/2013	0.33	0.33
Rape seed	HD	19/06/2013	1.95	3.8
Wheat	HD	19/06/2013	1.85	-
Wheat	HD	01/07/2013	1.01	1.01
Non Crop Use	KN	10/07/2013	1	1
Barley	HD	18/07/2013	0.26	0.26
Barley	HD	22/07/2013	1.79	1.79
			TOTAL	112

(a): These figures exclude seed treatments and days upon which the number of hours spent spraying was unknown (99)
(b): December 2014 download data

Table 50: Details of the active ingredients, mass applied and time spent for each active ingredient per day in chronological order for the UK case study (Forms 3)

actdate	actname	sum(nhours)	sum(kgai)
25/08/2012	Methiocarb	1.3	1.61
10/09/2012	Tepraloxydim	0.7	0.39
02/10/2012	Methiocarb	0.8	1.36
05/10/2012	Methiocarb	2.7	3.40
06/10/2012	Carbetamide	0.7	7.07
06/10/2012	Fluazifop-P-butyl	2.5	5.70
06/10/2012	Lambda-Cyhalothrin	2.0	0.10
17/10/2012	Flupyrsulfuron-methyl	4.4	0.36
25/10/2012	Lambda-Cyhalothrin	2.7	0.14
26/10/2012	Methiocarb	3.9	3.65
27/10/2012	Flupyrsulfuron-methyl	1.4	0.18
29/10/2012	Lambda-Cyhalothrin	0.9	0.04

actdate	actname	sum(nhours)	sum(kgai)
08/11/2012	Lambda-Cyhalothrin	2.7	0.15
11/11/2012	Carbendazim	3.1	2.30
11/11/2012	Flusilazole	3.1	4.78
11/11/2012	Lambda-Cyhalothrin	3.1	0.29
11/11/2012	Propyzamide	3.1	26.02
13/11/2012	Lambda-Cyhalothrin	3.0	0.50
14/11/2012	Lambda-Cyhalothrin	1.2	0.08
16/11/2012	Lambda-Cyhalothrin	1.8	0.11
20/02/2013	Chlorpyrifos	1.3	8.85
06/04/2013	Ethofumesate	2.5	28.81
09/04/2013	Ethofumesate	0.9	9.65
12/04/2013	Bifenox	0.4	1.47
12/04/2013	Clopyralid	1.4	1.12
12/04/2013	Picloram	0.9	0.20
13/04/2013	Clopyralid	0.9	1.17
13/04/2013	Picloram	0.9	0.27
15/04/2013	Clopyralid	0.8	0.92
15/04/2013	Picloram	0.8	0.21
20/04/2013	Iodosulfuron-methyl [a]	4.9	0.72
20/04/2013	Mesosulfuron	4.9	1.43
26/04/2013	Chlorothalonil	2.6	9.07
26/04/2013	Cyproconazole	2.6	1.23
26/04/2013	Propiconazole	2.6	1.47
30/04/2013	Iodosulfuron-methyl [a]	1.8	0.27
30/04/2013	Mesosulfuron	1.8	0.53
01/05/2013	Chlormequat chloride	2.8	11.14
01/05/2013	Cyprodinil	2.8	6.14
01/05/2013	Isopyrazam	2.8	1.94
01/05/2013	Mepiquat	2.8	3.71
01/05/2013	Pinoxaden	2.2	0.77
01/05/2013	Prothioconazole	2.8	1.94
01/05/2013	Tebuconazole	2.8	1.94
01/05/2013	Trinexapac-Ethyl	2.8	0.81
02/05/2013	Desmedipham	0.7	1.68
02/05/2013	Phenmedipham	0.7	1.68
04/05/2013	Boscalid	1.0	2.66
04/05/2013	Epoxiconazole	1.0	0.89
04/05/2013	Proquinazid	1.0	0.20
05/05/2013	Boscalid	2.2	5.10
05/05/2013	Chlormequat chloride	2.2	8.38
05/05/2013	Chlorothalonil	2.2	6.80
05/05/2013	Epoxiconazole	2.2	1.70

actdate	actname	sum(nhours)	sum(kgai)
05/05/2013	Mancozeb	2.2	4.62
05/05/2013	Mepiquat	2.2	2.79
05/05/2013	Trinexapac-Ethyl	2.2	1.22
06/05/2013	Tepraloxydim	0.7	0.72
07/05/2013	Boscalid	3.9	9.55
07/05/2013	Chlormequat chloride	3.9	15.70
07/05/2013	Chlorothalonil	3.9	12.74
07/05/2013	Epoxiconazole	3.9	3.18
07/05/2013	Mancozeb	3.9	8.65
07/05/2013	Mepiquat	3.9	5.23
07/05/2013	Trinexapac-Ethyl	3.9	2.27
10/05/2013	Boscalid	1.0	2.94
10/05/2013	Chlormequat chloride	1.0	4.83
10/05/2013	Chlorothalonil	1.0	3.92
10/05/2013	Epoxiconazole	1.0	0.98
10/05/2013	Mancozeb	1.0	2.66
10/05/2013	Mepiquat	1.0	1.61
10/05/2013	Trinexapac-Ethyl	1.0	0.70
11/05/2013	Cyprodinil	0.7	0.83
11/05/2013	Fluroxypyr	0.7	1.05
11/05/2013	Isopyrazam	0.7	0.26
11/05/2013	Metsulfuron-methyl	0.7	0.04
11/05/2013	Prothioconazole	0.7	0.21
11/05/2013	Tebuconazole	0.7	0.21
11/05/2013	Thifensulfuron-methyl	0.7	0.22
14/05/2013	Cyprodinil	2.1	2.24
14/05/2013	Fluroxypyr	2.1	2.83
14/05/2013	Isopyrazam	2.1	0.71
14/05/2013	Metsulfuron-methyl	2.1	0.11
14/05/2013	Prothioconazole	2.1	0.57
14/05/2013	Tebuconazole	2.1	0.57
14/05/2013	Thifensulfuron-methyl	2.1	0.58
16/05/2013	Desmedipham	2.5	4.61
16/05/2013	Lenacil	2.5	2.86
16/05/2013	Phenmedipham	2.5	4.61
16/05/2013	Triflusulfuron-Methyl	2.5	0.20
25/05/2013	Boscalid	1.0	2.66
25/05/2013	Chlormequat	1.0	7.34
25/05/2013	Chlorothalonil	1.0	3.54
25/05/2013	Epoxiconazole	1.0	0.89
25/05/2013	Fluroxypyr	1.0	1.27
25/05/2013	Mancozeb	1.0	2.40

actdate	actname	sum(nhours)	sum(kgai)
25/05/2013	Metsulfuron-methyl	1.0	0.04
25/05/2013	Proquinazid	1.0	0.20
25/05/2013	Thifensulfuron-methyl	1.0	0.23
25/05/2013	Trinexapac-Ethyl	1.0	0.32
31/05/2013	Ethofumesate	3.1	4.57
31/05/2013	Lenacil	3.1	4.35
31/05/2013	Metamitron	3.1	12.66
31/05/2013	Phenmedipham	3.1	3.66
31/05/2013	Tepraloxydim	0.2	0.17
31/05/2013	Triflusulfuron-Methyl	3.1	0.31
01/06/2013	Bixafen	6.3	5.80
01/06/2013	Fluroxypyr	6.3	10.87
01/06/2013	Metsulfuron-methyl	6.3	0.24
01/06/2013	Prothioconazole	6.3	7.97
01/06/2013	Tebuconazole	6.3	6.52
01/06/2013	Thifensulfuron-methyl	6.3	1.34
03/06/2013	Bixafen	0.8	0.91
03/06/2013	Fluroxypyr	0.8	1.70
03/06/2013	Metsulfuron-methyl	0.8	0.04
03/06/2013	Prothioconazole	0.8	1.25
03/06/2013	Tebuconazole	0.8	1.02
03/06/2013	Thifensulfuron-methyl	0.8	0.21
04/06/2013	Tepraloxydim	0.9	0.72
05/06/2013	Azoxystrobin	0.7	0.79
05/06/2013	Lambda-Cyhalothrin	0.7	0.06
05/06/2013	Prothioconazole	0.7	0.47
05/06/2013	Tebuconazole	0.7	0.47
07/06/2013	Desmedipham	0.4	0.94
07/06/2013	Metamitron	0.4	2.05
07/06/2013	Phenmedipham	0.4	0.94
14/06/2013	Clopyralid	0.8	0.43
14/06/2013	Lenacil	1.0	1.17
14/06/2013	Metamitron	0.2	0.80
14/06/2013	Phenmedipham	1.0	2.77
14/06/2013	Triflusulfuron-Methyl	1.0	0.08
16/06/2013	Bixafen	3.1	1.47
16/06/2013	Clopyralid	0.9	0.43
16/06/2013	Lenacil	0.9	0.96
16/06/2013	Phenmedipham	0.9	2.27
16/06/2013	Proquinazid	1.0	0.20
16/06/2013	Prothioconazole	5.1	2.70
16/06/2013	Tebuconazole	5.1	2.33

actdate	actname	sum(nhours)	sum(kgai)
16/06/2013	Triflusulfuron-Methyl	0.9	0.07
17/06/2013	Azoxystrobin	0.5	0.70
17/06/2013	Bixafen	3.2	0.74
17/06/2013	Clodinafop-propargyl	1.0	0.38
17/06/2013	Lambda-Cyhalothrin	0.5	0.05
17/06/2013	Prothioconazole	6.9	2.54
17/06/2013	Tebuconazole	6.9	2.35
18/06/2013	Fluazifop-P-butyl	0.3	0.66
19/06/2013	Azoxystrobin	2.0	2.34
19/06/2013	Bixafen	1.9	0.49
19/06/2013	Lambda-Cyhalothrin	2.0	0.18
19/06/2013	Prothioconazole	5.7	2.80
19/06/2013	Tebuconazole	5.7	2.68
01/07/2013	Prothioconazole	1.0	0.76
01/07/2013	Tebuconazole	1.0	0.76
18/07/2013	Glyphosate	0.3	1.61
22/07/2013	Glyphosate	1.8	13.23
Non crop areas			
(null)	Brodifacoum	1.0	0.000125
(null)	Difenacoum	1.0	0.000250
(null)	Glyphosate	0.1	0.18
10/07/2013	Deltamethrin (cis-deltamethrin)	0.5	7.50

(a): December 2014 download data

Table 51: Details of the principal operator and sprayer details for the UK case study (Forms 4 and 5)

Details	Response	Detail
PRINCIPAL OPERATOR		
age (y)	49	
gender	M	
status	FT (full-time)	
optype	OT (owner/tenant)	Relationship to the holding
sprayexp	30	Years of spraying experience
percspray	95	Percentage of all spraying undertaken
certify	Y	Spraying certificate
certtype	TH (theory (desk based))	PPE application certificate type
SPRAYER DETAILS		
spno	01	Farm sprayer number
sp1	HD (hydraulic boom (downwards))	Sprayer type
spname	Bargham trailed (Italian)	Manufacturers name and model

spowner	FM (farm owned)	Sprayer owner
sptest	TRUE	Testing of sprayer as part of a sprayer testing scheme
sd1	95	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	3	Typical sprayer speed
main tank capacity	2500	(L)
auxillary tank capacity	220	(L)
hand wash capacity	20	(L)
sd5	24	Boom width (m)
age	4	Sprayer age (y)
m & l time	0.25	Mixing and loading time on each load (h)
m & l/day	4	Mixing and loading events in a day
cleaning time	0.5	Average time spent cleaning sprayer (h)
cleaning/yr	2	Average number times sprayer cleaned in a year

spno	02	Farm sprayer number
sp1	KN (Lever operated/pressurised knapsack)	Sprayer type
spname	Berthoud (grain stores)	Manufacturers name and model
spowner	FM (farm owned)	Sprayer owner
sptest	FALSE	Testing of sprayer as part of a sprayer testing scheme
sd1	1	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	-	Typical sprayer speed
main tank capacity	15	(L)
auxillary tank capacity	-	(L)
hand wash capacity	-	(L)
sd5	-	Boom width (m)
age	2	Sprayer age (y)
m & l time	0.03	Mixing and loading time on each load (h)
m & l/day	2	Mixing and loading events in a day
cleaning time	-	Average time spent cleaning sprayer (h)
cleaning/yr	-	Average number times sprayer cleaned in a year

spno	03	Farm sprayer number
sp1	MB (Molluscicdes broadcast (vehicle mounted))	Sprayer type
spname	Kuhn 18m Pneumatic spreader	Manufacturers name and model
spowner	FM (farm owned)	Sprayer owner
sptest	TRUE	Testing of sprayer as part of a sprayer testing scheme
sd1	4	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	10	Typical sprayer speed
main tank capacity	-	(L)
auxillary tank capacity	-	(L)
hand wash capacity	-	(L)
sd5	-	Boom width (m)
age	2	Sprayer age (y)
m & l time	-	Mixing and loading time on each load (h)

m & l/day	-	Mixing and loading events in a day
cleaning time	-	Average time spent cleaning sprayer (h)
cleaning/yr	-	Average number times sprayer cleaned in a year

Table 52: PPE used by the principal operator in UK case study during spraying and worker activities (Form 4)

optype	opm_app	description	ppetype	description	ppenum
AP	HD	Pesticide application (Hydraulic boom)	C4	Work wear: breathable (cotton/polyester)	1
AP	HD	Pesticide application (Hydraulic boom)	LB	Leather/fabric boots	not done
AP	KN	Pesticide application (Lever operated/pressurised knapsack)	C4	Work wear: breathable (cotton/polyester)	1
AP	KN	Pesticide application (Lever operated/pressurised knapsack)	LB	Leather/fabric boots	not done
AP	MB	Pesticide application (Molluscicides broadcast(vehicle mounted))	C4	Work wear: breathable (cotton/polyester)	1
AP	MB	Pesticide application (Molluscicides broadcast(vehicle mounted))	LB	Leather/fabric boots	not done
CL	CL	Cleaning the sprayer	C4	Work wear: breathable (cotton/polyester)	1
CL	CL	Cleaning the sprayer	GN	Gloves - Nitrile	1
CL	CL	Cleaning the sprayer	RB	Rubber boots	1
ML	ML	Mixing and loading (liquids)	C4	Work wear: breathable (cotton/polyester)	1
ML	ML	Mixing and loading (liquids)	GN	Gloves - Nitrile	10
ML	ML	Mixing and loading (liquids)	LB	Leather/fabric boots	not done
ML	MS	Mixing and loading (solids)	C4	Work wear: breathable (cotton/polyester)	1
ML	MS	Mixing and loading (solids)	GN	Gloves - Nitrile	10
ML	MS	Mixing and loading (solids)	LB	Leather/fabric boots	not done
WA	CR	Worker activities (crop rogueing)	C4	Work wear: breathable (cotton/polyester)	1
WA	CR	Worker activities (crop rogueing)	LB	Leather/fabric boots	not done
WA	DL	Worker activities (drilling/filling)	C4	Work wear: breathable (cotton/polyester)	1
WA	DL	Worker activities (drilling/filling)	LB	Leather/fabric boots	not done
WA	ER	Worker activities (earliest re-entry time)	LB	Leather/fabric boots	not done
WA	ER	Worker activities (earliest re-entry time)	LC	Long clothes	1
WA	ER	Worker activities (earliest re-entry time)	SC	Short clothes	1
WA	IN	Worker activities (inspection)	C4	Work wear: breathable (cotton/polyester)	1
WA	IN	Worker activities (inspection)	LB	Leather/fabric boots	not done
WA	VC	Worker activities (vertebrate control measures)	C4	Work wear: breathable (cotton/polyester)	1
WA	VC	Worker activities (vertebrate control measures)	LB	Leather/fabric boots	not done

Table 53: Date and time spent by the principal operator in the UK case study on other worker activities (Form 6)

actdate	dte	activity	description	actual_crop	nhours
01/08/2012	-	DL	Drilling/filling	Winter oilseed Rape	0.04
23/08/2013	-	DL	Drilling/filling	Winter Oilseed Rape	0.14
07/09/2012	-	DL	Drilling/filling	Winter Oilseed Rape	0.16
07/09/2012	-	DL	Drilling/filling	Winter Oilseed rape	0.12
08/09/2012	-	DL	Drilling/filling	Winter Oilseed Rape	0.09
10/09/2012	-	DL	Drilling/filling	Winter Oilseed rape	0.19
15/09/2012	-	DL	Drilling/filling	Winter Oilseed Rape	0.12
-	E3	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M3	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L3	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	E4	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M4	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L4	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	E5	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M5	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L5	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	E6	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M6	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L6	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M7	CR	Crop rogueing	Sugar beet	9
-	L7	CR	Crop rogueing	Sugar beet	9
-	E8	CR	Crop rogueing	Sugar beet	9
-	E9	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M9	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L9	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	E10	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M10	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	L10	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	E11	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	M11	IN	Inspection	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	2
-	UN	ER	Earliest R-entry time	Sugar beet, wheat, winter barley, spring wheat, osr, grainstores	-

3.3.1.4. Case Study - Southern zone – Greece

In the case of the GR dataset a farm (SGT07) has been selected which is considered a typical farm (10.5 ha) with only one spray operator growing two crops (peaches and wine grapes) (Table 54).

Table 54: Details of the farm selected for the GR case study (Forms 1 and 2)

Details	Response			
NUMBER OF FARMS MANAGED & CROPPING AREAS				
number of farms managed	1			
area of farm (all crops) ha	10.5			
% of farm sampled	100 [a]			
SPRAY OPERATORS				
number of spray operators	1			
% treated by contractor	0			
use of agronomists	TRUE			
CROPPING	name	code	actual_crop	sum(area) ha
	Peaches	P0140030A	Peaches	6
	Wine grapes	P0151020A	Wine grapes	5
WATERCOURSES & USE OF BUFFER STRIPS ON THE FARM				
permanent watercourse	FALSE			
temporary watercourse	FALSE			
field margin buffer strips	FALSE			
wind breaks	FALSE			
in-crop buffer strips	FALSE			
INTEGRATED CROP MANAGEMENT ON THE FARM				
IPM used on farm?	TRUE			
crop rotation	FALSE			
resistant varieties	TRUE			
monitoring traps	TRUE			
biological control	FALSE			
predictive models	FALSE			
beneficial populations	FALSE			
optimise pesticide choice	TRUE			
additional details	none			

The data from the GR case study are presented in a number of forms to illustrate the data. In Table 55 the summary cropping data for the farm are shown, indicating the areas grown of each crop, and the total areas actually treated with pesticide in 2013. Some of the fields were treated several times and/or tank mixes were used; hence the large treated areas as presented in the table when compared to the area grown.

Table 58 provides details of the time the principal spray operator spent applying PPPs per crop per day, and per day in chronological order. In total during the 2013 cropping year the principal operator on the farm spent 115 h applying PPPs over 137 ha. Overall 30 active ingredients were used throughout the year and Table 59 provides details of the identity, mass applied and time spent for each active ingredient per day by the principal operator. This information provides details of what the

operator used on a daily basis on the farm. The active ingredient used can be summed for daily, weekly or monthly uses etc.

Table 60 provides details of the principal operator and the sprayers on the GR case study farm. Table 61 provides information on the PPE worn by the principal operator during spraying and other worker activities and Table 62 provides details of the date and time spent by the principal operator on other worker activities.

Table 55: Crops surveyed on the farm selected in 2013 for the GR case study (Form 3)

code	concat(holno,fieldno)	name	code	area grown (ha)	area treated (ha) [a,b]
GR	SGT0701	Wine grapes	P0151020A	4.50	135.0
GR	SGT0702	Peaches	P0140030A	3.70	74.0
GR	SGT0703	Peaches	P0140030A	2.30	18.4
			TOTAL	10.5	227.4

(a): the area treated excludes seed treatments
(b): includes cumulative applications to the same field and the area of each product within a tank mix
(c): December 2014 download data

Table 56: PPP application data for the GR case study, sorted by field number and date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0701	Wine grapes	28/02/2013	Clinic 360 SL	HD	1	Glyphosate	08:00	4	0.81	0.81
SGT0701	Wine grapes	15/03/2013	ROUNDUP 36 SL	HD	2	Glyphosate	08:00	4	2.88	2.88
SGT0701	Wine grapes	05/04/2013	FOLPET MAKHTESHIM 80 WG	BA	3	Folpet	08:00	4	2.40	2.40
SGT0701	Wine grapes	05/04/2013	THIOVIT 80 WG	BA	3	Sulphur	08:00	4	3.20	3.20
SGT0701	Wine grapes	13/04/2013	FOLPET MAKHTESHIM 80 WG	BA	4	Folpet	08:00	4	2.40	2.40
SGT0701	Wine grapes	13/04/2013	THIOVIT 80 WG	BA	4	Sulphur	08:00	4	3.20	3.20
SGT0701	Wine grapes	20/04/2013	ROUNDUP 36 SL	HD	5	Glyphosate	08:00	4	2.88	2.88
SGT0701	Wine grapes	24/04/2013	QUADRIS MAX 9.35/50 SC	BA	6	Folpet	08:00	4	0.59	0.50
SGT0701	Wine grapes	24/04/2013	QUADRIS MAX 9.35/50 SC	BA	6	Azoxystrobin	08:00	4	0.59	0.09
SGT0701	Wine grapes	24/04/2013	Alper 4/64 WP	BA	7	Maneb	08:00	4	0.17	0.16
SGT0701	Wine grapes	24/04/2013	Alper 4/64 WP	BA	7	Cymoxanil	08:00	4	0.17	0.01
SGT0701	Wine grapes	24/04/2013	PYRINEX 25 SC	BA	7	Chlorpyrifos	08:00	4	0.05	0.05
SGT0701	Wine grapes	24/04/2013	THIOVIT 80 WG	BA	7	Sulphur	08:00	4	0.16	0.16
SGT0701	Wine grapes	04/05/2013	Atemi 10 WG	BA	8	Cyproconazole	08:00	4	0.02	0.02
SGT0701	Wine grapes	03/06/2013	RELDAN 225 EC	BA	99	Chlorpyrifos-methyl	08:00	4	1.69	1.69
SGT0701	Wine grapes	12/06/2013	Electis 750 WG	BA	10	Zoxamide	08:00	4	4.05	0.45
SGT0701	Wine grapes	12/06/2013	Electis 750 WG	BA	10	Mancozeb	08:00	4	4.05	3.60
SGT0701	Wine grapes	12/06/2013	Indar 5 EW	BA	10	Fenbuconazole	08:00	4	0.09	0.09
SGT0701	Wine grapes	12/06/2013	PYRINEX 25 SC	BA	10	Chlorpyrifos	08:00	4	1.50	1.50
SGT0701	Wine grapes	26/06/2013	HELIOS 250 SC	BA	11	Quinoxyfen	08:00	4	0.12	0.12
SGT0701	Wine grapes	26/06/2013	PYRINEX 25 SC	BA	11	Chlorpyrifos	08:00	4	1.00	1.00

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0701	Wine grapes	02/07/2013	PYRINEX 25 SC	BA	12	Chlorpyrifos	08:00	4	1.00	1.00
SGT0701	Wine grapes	02/07/2013	SYSTHANE 12 EC	BA	12	Myclobutanil	08:00	4	0.06	0.06
SGT0701	Wine grapes	25/07/2013	Alper 4/64 WP	BA	13	Maneb	08:00	4	6.80	6.40
SGT0701	Wine grapes	25/07/2013	Alper 4/64 WP	BA	13	Cymoxanil	08:00	4	6.80	0.40
SGT0701	Wine grapes	25/07/2013	RELDAN 225 EC	BA	13	Chlorpyrifos-methyl	08:00	4	2.25	2.25
SGT0701	Wine grapes	07/08/2013	KOCIDE 2000 35 WG	BA	14	Copper hydroxide	08:00	4	0.88	0.88
SGT0701	Wine grapes	07/08/2013	PYRINEX 25 SC	BA	14	Chlorpyrifos	08:00	4	0.50	0.50
SGT0701	Wine grapes	07/08/2013	KOCIDE 2000 35 WG	BA	15	Copper hydroxide	08:00	4	0.88	0.88
SGT0701	Wine grapes	07/08/2013	Neotopsin 50 SC	BA	15	Thiophanate-methyl	08:00	4	0.25	0.25
SGT0701	Wine grapes	07/08/2013	Switch 25/37.5 WG	HD	18	Cyprodinil	08:00	4	0.50	0.30
SGT0701	Wine grapes	07/08/2013	Switch 25/37.5 WG	HD	18	Fludioxonil	08:00	4	0.50	0.20
SGT0701	Wine grapes	22/08/2013	Karate 10 SC	BA	16	Lambda-Cyhalothrin	08:00	4	0.01	0.01
SGT0701	Wine grapes	22/08/2013	Switch 25/37.5 WG	HD	17	Cyprodinil	08:00	4	0.50	0.30
SGT0701	Wine grapes	22/08/2013	Switch 25/37.5 WG	HD	17	Fludioxonil	08:00	4	0.50	0.20
SGT0702	Peaches	13/02/2013	XYDROCOURE 40 WG	BA	1	Copper and derivatives	08:00	1	4.00	4.00
SGT0702	Peaches	27/02/2013	Admiral 10 EC	BA	2	Pyriproxyfen	09:00	2	0.12	0.12
SGT0702	Peaches	27/02/2013	LAINCOIL	BA	2	paraffin oil	09:00	2	7.72	7.72
SGT0702	Peaches	28/02/2013	Kohinor 200 SL	BA	3	Imidacloprid	08:00	2.5	0.20	0.20
SGT0702	Peaches	28/02/2013	ZIRAM	BA	3	Ziram	08:00	2.5	7.20	7.20
SGT0702	Peaches	03/03/2013	ZIRAM	BA	4	Ziram	08:00	2	7.20	7.20
SGT0702	Peaches	09/03/2013	Clinic 360 SL	HD	5	Glyphosate	08:00	2	3.24	3.24
SGT0702	Peaches	21/03/2013	MERPAN 80 WG	BA	6	Captan	08:00	2.5	2.40	2.40
SGT0702	Peaches	21/03/2013	MICROTHIOL SPECIAL 80 WG	BA	6	Sulphur	08:00	2.5	6.40	6.40
SGT0702	Peaches	05/04/2013	COYOTE 5 EC	BA	7	Cyfluthrin	07:00	3	0.10	0.10

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0702	Peaches	05/04/2013	MICROTHIOL SPECIAL 80 WG	BA	7	Sulphur	07:00	3	6.40	6.40
SGT0702	Peaches	05/04/2013	ZIRAM	BA	7	Ziram	07:00	3	7.20	7.20
SGT0702	Peaches	17/04/2013	Myclobutanil 12.5 EC	BA	8	Myclobutanil	07:00	3	0.21	0.21
SGT0702	Peaches	17/04/2013	PYRINEX 25 SC	BA	8	Chlorpyrifos	07:00	3	1.50	1.50
SGT0702	Peaches	30/04/2013	TEBU-MAX 20 EW	BA	9	Tebuconazole	07:00	3	0.40	0.40
SGT0702	Peaches	14/05/2013	COYOTE 5 EC	BA	10	Cyfluthrin	06:00	3	0.10	0.10
SGT0702	Peaches	14/05/2013	Neotopsin 50 SC	BA	10	Thiophanate-methyl	06:00	3	1.40	1.40
SGT0702	Peaches	23/05/2013	Bulldock 2.5 SC	BA	11	Beta-cyfluthrin	06:00	2	0.06	0.06
SGT0702	Peaches	23/05/2013	Nimrod 25 EC	BA	11	Bupirimate	06:00	2	1.50	1.50
SGT0702	Peaches	08/06/2013	Clinic 360 SL	HD	12	Glyphosate	06:00	4	2.52	2.52
SGT0703	Peaches	09/06/2013	COYOTE 5 EC	BA	1	Cyfluthrin	06:00	3	0.06	0.06
SGT0703	Peaches	09/06/2013	TEBU-MAX 20 EW	BA	1	Tebuconazole	06:00	3	0.25	0.25
SGT0703	Peaches	22/06/2013	Decis 2.5 EC	BA	2	Deltamethrin (cis-deltamethrin)	06:00	2	0.03	0.03
SGT0703	Peaches	22/06/2013	Myclobutanil 12.5 EC	BA	2	Myclobutanil	06:00	2	0.13	0.13
SGT0703	Peaches	29/06/2013	Nimrod 25 EC	BA	3	Bupirimate	06:00	3	0.88	0.88
SGT0703	Peaches	29/06/2013	PYRINEX 48 EC	BA	4	Chlorpyrifos	06:00	3	1.68	1.68
SGT0703	Peaches	09/07/2013	Bulldock 2.5 SC	BA	5	Beta-cyfluthrin	06:00	2	0.04	0.04
SGT0703	Peaches	09/07/2013	TEBU-MAX 20 EW	BA	5	Tebuconazole	06:00	2	0.25	0.25

(a): December 2014 download data

Table 57: PPP application data for the GR case study, sorted by date of application (Form 3)

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0702	Peaches	13/02/2013	XYDROCOURE 40 WG	BA	1	Copper and derivatives	08:00	1	4.00	4.00
SGT0702	Peaches	27/02/2013	Admiral 10 EC	BA	2	Pyriproxyfen	09:00	2	0.12	0.12
SGT0702	Peaches	27/02/2013	LAINCOIL	BA	2	paraffin oil	09:00	2	7.72	7.72
SGT0701	Wine grapes	28/02/2013	Clinic 360 SL	HD	1	Glyphosate	08:00	4	0.81	0.81
SGT0702	Peaches	28/02/2013	Kohinor 200 SL	BA	3	Imidacloprid	08:00	2.5	0.20	0.20
SGT0702	Peaches	28/02/2013	ZIRAM	BA	3	Ziram	08:00	2.5	7.20	7.20
SGT0702	Peaches	03/03/2013	ZIRAM	BA	4	Ziram	08:00	2	7.20	7.20
SGT0702	Peaches	09/03/2013	Clinic 360 SL	HD	5	Glyphosate	08:00	2	3.24	3.24
SGT0701	Wine grapes	15/03/2013	ROUNDUP 36 SL	HD	2	Glyphosate	08:00	4	2.88	2.88
SGT0702	Peaches	21/03/2013	MERPAN 80 WG	BA	6	Captan	08:00	2.5	2.40	2.40
SGT0702	Peaches	21/03/2013	MICROTHIOL SPECIAL 80 WG	BA	6	Sulphur	08:00	2.5	6.40	6.40
SGT0701	Wine grapes	05/04/2013	FOLPET MAKHTESHIM 80 WG	BA	3	Folpet	08:00	4	2.40	2.40
SGT0701	Wine grapes	05/04/2013	THIOVIT 80 WG	BA	3	Sulphur	08:00	4	3.20	3.20
SGT0702	Peaches	05/04/2013	COYOTE 5 EC	BA	7	Cyfluthrin	07:00	3	0.10	0.10
SGT0702	Peaches	05/04/2013	MICROTHIOL SPECIAL 80 WG	BA	7	Sulphur	07:00	3	6.40	6.40
SGT0702	Peaches	05/04/2013	ZIRAM	BA	7	Ziram	07:00	3	7.20	7.20
SGT0701	Wine grapes	13/04/2013	FOLPET MAKHTESHIM 80 WG	BA	4	Folpet	08:00	4	2.40	2.40
SGT0701	Wine grapes	13/04/2013	THIOVIT 80 WG	BA	4	Sulphur	08:00	4	3.20	3.20
SGT0702	Peaches	17/04/2013	Myclobutanil 12.5 EC	BA	8	Myclobutanil	07:00	3	0.21	0.21
SGT0702	Peaches	17/04/2013	PYRINEX 25 SC	BA	8	Chlorpyrifos	07:00	3	1.50	1.50

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0701	Wine grapes	20/04/2013	ROUNDUP 36 SL	HD	5	Glyphosate	08:00	4	2.88	2.88
SGT0701	Wine grapes	24/04/2013	QUADRIS MAX 9.35/50 SC	BA	6	Folpet	08:00	4	0.59	0.50
SGT0701	Wine grapes	24/04/2013	QUADRIS MAX 9.35/50 SC	BA	6	Azoxystrobin	08:00	4	0.59	0.09
SGT0701	Wine grapes	24/04/2013	Alper 4/64 WP	BA	7	Maneb	08:00	4	0.17	0.16
SGT0701	Wine grapes	24/04/2013	Alper 4/64 WP	BA	7	Cymoxanil	08:00	4	0.17	0.01
SGT0701	Wine grapes	24/04/2013	PYRINEX 25 SC	BA	7	Chlorpyrifos	08:00	4	0.05	0.05
SGT0701	Wine grapes	24/04/2013	THIOVIT 80 WG	BA	7	Sulphur	08:00	4	0.16	0.16
SGT0702	Peaches	30/04/2013	TEBU-MAX 20 EW	BA	9	Tebuconazole	07:00	3	0.40	0.40
SGT0701	Wine grapes	04/05/2013	Atemi 10 WG	BA	8	Cyproconazole	08:00	4	0.02	0.02
SGT0702	Peaches	14/05/2013	COYOTE 5 EC	BA	10	Cyfluthrin	06:00	3	0.10	0.10
SGT0702	Peaches	14/05/2013	Neotopsin 50 SC	BA	10	Thiophanate-methyl	06:00	3	1.40	1.40
SGT0702	Peaches	23/05/2013	Bulldock 2.5 SC	BA	11	Beta-cyfluthrin	06:00	2	0.06	0.06
SGT0702	Peaches	23/05/2013	Nimrod 25 EC	BA	11	Bupirimate	06:00	2	1.50	1.50
SGT0701	Wine grapes	03/06/2013	RELDAN 225 EC	BA	99	Chlorpyrifos-methyl	08:00	4	1.69	1.69
SGT0702	Peaches	08/06/2013	Clinic 360 SL	HD	12	Glyphosate	06:00	4	2.52	2.52
SGT0703	Peaches	09/06/2013	COYOTE 5 EC	BA	1	Cyfluthrin	06:00	3	0.06	0.06
SGT0703	Peaches	09/06/2013	TEBU-MAX 20 EW	BA	1	Tebuconazole	06:00	3	0.25	0.25
SGT0701	Wine grapes	12/06/2013	Electis 750 WG	BA	10	Zoxamide	08:00	4	4.05	0.45
SGT0701	Wine grapes	12/06/2013	Electis 750 WG	BA	10	Mancozeb	08:00	4	4.05	3.60
SGT0701	Wine grapes	12/06/2013	Indar 5 EW	BA	10	Fenbuconazole	08:00	4	0.09	0.09
SGT0701	Wine grapes	12/06/2013	PYRINEX 25 SC	BA	10	Chlorpyrifos	08:00	4	1.50	1.50
SGT0703	Peaches	22/06/2013	Decis 2.5 EC	BA	2	Deltamethrin (cis-deltamethrin)	06:00	2	0.03	0.03
SGT0703	Peaches	22/06/2013	Myclobutanil 12.5 EC	BA	2	Myclobutanil	06:00	2	0.13	0.13
SGT0701	Wine grapes	26/06/2013	HELIOS 250 SC	BA	11	Quinoxyfen	08:00	4	0.12	0.12

fieldno	name	actdate	product	m_app	sp_rnd	actname	start	nhours	kgtot	kgai
SGT0701	Wine grapes	26/06/2013	PYRINEX 25 SC	BA	11	Chlorpyrifos	08:00	4	1.00	1.00
SGT0703	Peaches	29/06/2013	Nimrod 25 EC	BA	3	Bupirimate	06:00	3	0.88	0.88
SGT0703	Peaches	29/06/2013	PYRINEX 48 EC	BA	4	Chlorpyrifos	06:00	3	1.68	1.68
SGT0701	Wine grapes	02/07/2013	PYRINEX 25 SC	BA	12	Chlorpyrifos	08:00	4	1.00	1.00
SGT0701	Wine grapes	02/07/2013	SYSTHANE 12 EC	BA	12	Myclobutanil	08:00	4	0.06	0.06
SGT0703	Peaches	09/07/2013	Bulldock 2.5 SC	BA	5	Beta-cyfluthrin	06:00	2	0.04	0.04
SGT0703	Peaches	09/07/2013	TEBU-MAX 20 EW	BA	5	Tebuconazole	06:00	2	0.25	0.25
SGT0701	Wine grapes	25/07/2013	Alper 4/64 WP	BA	13	Maneb	08:00	4	6.80	6.40
SGT0701	Wine grapes	25/07/2013	Alper 4/64 WP	BA	13	Cymoxanil	08:00	4	6.80	0.40
SGT0701	Wine grapes	25/07/2013	RELDAN 225 EC	BA	13	Chlorpyrifos-methyl	08:00	4	2.25	2.25
SGT0701	Wine grapes	07/08/2013	KOCIDE 2000 35 WG	BA	14	Copper hydroxide	08:00	4	0.88	0.88
SGT0701	Wine grapes	07/08/2013	PYRINEX 25 SC	BA	14	Chlorpyrifos	08:00	4	0.50	0.50
SGT0701	Wine grapes	07/08/2013	KOCIDE 2000 35 WG	BA	15	Copper hydroxide	08:00	4	0.88	0.88
SGT0701	Wine grapes	07/08/2013	Neotopsin 50 SC	BA	15	Thiophanate-methyl	08:00	4	0.25	0.25
SGT0701	Wine grapes	07/08/2013	Switch 25/37.5 WG	HD	18	Cyprodinil	08:00	4	0.50	0.30
SGT0701	Wine grapes	07/08/2013	Switch 25/37.5 WG	HD	18	Fludioxonil	08:00	4	0.50	0.20
SGT0701	Wine grapes	22/08/2013	Karate 10 SC	BA	16	Lambda-Cyhalothrin	08:00	4	0.01	0.01
SGT0701	Wine grapes	22/08/2013	Switch 25/37.5 WG	HD	17	Cyprodinil	08:00	4	0.50	0.30
SGT0701	Wine grapes	22/08/2013	Switch 25/37.5 WG	HD	17	Fludioxonil	08:00	4	0.50	0.20

(a): December 2014 download data

Table 58: Details of the time the principal spray operator spent apply PPPs per crop in chronological order for the GR case study (Forms 3)

crop	m_app	actdate	sum(nhours) per crop	sum(nhours) per day
Peaches	BA	13/02/2013	1	1
Peaches	BA	27/02/2013	2	2
Peaches	BA	28/02/2013	2.5	6.5
Wine grapes	HD	28/02/2013	4	-
Peaches	BA	03/03/2013	2	2
Peaches	HD	09/03/2013	2	2
Wine grapes	HD	15/03/2013	4	4
Peaches	BA	21/03/2013	2.5	2.5
Peaches	BA	05/04/2013	3	7
Wine grapes	BA	05/04/2013	4	-
Wine grapes	BA	13/04/2013	4	4
Peaches	BA	17/04/2013	3	3
Wine grapes	HD	20/04/2013	4	4
Wine grapes	BA	24/04/2013	8	8
Peaches	BA	30/04/2013	3	3
Wine grapes	BA	04/05/2013	4	4
Peaches	BA	14/05/2013	3	3
Peaches	BA	23/05/2013	2	2
Wine grapes	BA	03/06/2013	4	4
Peaches	HD	08/06/2013	4	4
Peaches	BA	09/06/2013	3	3
Wine grapes	BA	12/06/2013	4	4
Peaches	BA	22/06/2013	2	2
Wine grapes	BA	26/06/2013	4	4
Peaches	BA	29/06/2013	6	6
Wine grapes	BA	02/07/2013	4	4
Peaches	BA	09/07/2013	2	2
Wine grapes	BA	25/07/2013	4	4
Wine grapes	BA	07/08/2013	8	12
Wine grapes	HD	07/08/2013	4	-
Wine grapes	BA	22/08/2013	4	8
Wine grapes	HD	22/08/2013	4	-
			TOTAL	115

(a): These figures exclude seed treatments and days upon which the number of hours spent spraying was unknown (99)
(b): December 2014 download data

Table 59: Details of the active ingredients, mass applied and time spent for each active ingredient per day in chronological order for the GR case study (Forms 3)

actdate	actname	sum(nhours)	sum(kgai)
13/02/2013	Copper and derivatives	1.0	4.00
27/02/2013	Paraffin oil	2.0	7.72
27/02/2013	Pyriproxyfen	2.0	0.12
28/02/2013	Glyphosate	4.0	0.81
28/02/2013	Imidacloprid	2.5	0.20
28/02/2013	Ziram	2.5	7.20
03/03/2013	Ziram	2.0	7.20
09/03/2013	Glyphosate	2.0	3.24
15/03/2013	Glyphosate	4.0	2.88
21/03/2013	Captan	2.5	2.40
21/03/2013	Sulphur	2.5	6.40
05/04/2013	Cyfluthrin	3.0	0.10
05/04/2013	Folpet	4.0	2.40
05/04/2013	Sulphur	7.0	9.60
05/04/2013	Ziram	3.0	7.20
13/04/2013	Folpet	4.0	2.40
13/04/2013	Sulphur	4.0	3.20
17/04/2013	Chlorpyrifos	3.0	1.50
17/04/2013	Myclobutanil	3.0	0.21
20/04/2013	Glyphosate	4.0	2.88
24/04/2013	Azoxystrobin	4.0	0.09
24/04/2013	Chlorpyrifos	4.0	0.05
24/04/2013	Cymoxanil	4.0	0.01
24/04/2013	Folpet	4.0	0.50
24/04/2013	Maneb	4.0	0.16
24/04/2013	Sulphur	4.0	0.16
30/04/2013	Tebuconazole	3.0	0.40
04/05/2013	Cyproconazole	4.0	0.02
14/05/2013	Cyfluthrin	3.0	0.10
14/05/2013	Thiophanate-methyl	3.0	1.40
23/05/2013	Beta-cyfluthrin	2.0	0.06
23/05/2013	Bupirimate	2.0	1.50
03/06/2013	Chlorpyrifos-methyl	4.0	1.69
08/06/2013	Glyphosate	4.0	2.52
09/06/2013	Cyfluthrin	3.0	0.06
09/06/2013	Tebuconazole	3.0	0.25
12/06/2013	Chlorpyrifos	4.0	1.50
12/06/2013	Fenbuconazole	4.0	0.09

12/06/2013	Mancozeb	4.0	3.60
12/06/2013	Zoxamide	4.0	0.45
22/06/2013	Deltamethrin (cis-deltamethrin)	2.0	0.03
22/06/2013	Myclobutanil	2.0	0.13
26/06/2013	Chlorpyrifos	4.0	1.00
26/06/2013	Quinoxyfen	4.0	0.12
29/06/2013	Bupirimate	3.0	0.88
29/06/2013	Chlorpyrifos	3.0	1.68
02/07/2013	Chlorpyrifos	4.0	1.00
02/07/2013	Myclobutanil	4.0	0.06
09/07/2013	Beta-cyfluthrin	2.0	0.04
09/07/2013	Tebuconazole	2.0	0.25
25/07/2013	Chlorpyrifos-methyl	4.0	2.25
25/07/2013	Cymoxanil	4.0	0.40
25/07/2013	Maneb	4.0	6.40
07/08/2013	Chlorpyrifos	4.0	0.50
07/08/2013	Copper hydroxide	4.0	1.75
07/08/2013	Cyprodinil	4.0	0.30
07/08/2013	Fludioxonil	4.0	0.20
07/08/2013	Thiophanate-methyl	4.0	0.25
22/08/2013	Cyprodinil	4.0	0.30
22/08/2013	Fludioxonil	4.0	0.20
22/08/2013	Lambda-Cyhalothrin	4.0	0.01

(a): December 2014 download data

Table 60: Details of the principal operator and sprayer details for the GR case study (Forms 4 and 5)

Details	Response	Detail
PRINCIPAL OPERATOR		
age (y)	48	
gender	M	
status	FT (full-time)	
optype	OT (owner/tenant)	Relationship to the holding
sprayexp	20	Years of spraying experience
percspray	100	Percentage of all spraying undertaken
certify	N	Spraying certificate
certtype	TH (theory (desk based))	PPE application certificate type
SPRAYER DETAILS		
spno	01	Farm sprayer number
sp1	BA (Broadcast air assisted sprayer)	Sprayer type
spname	R-MAX	Manufacturers name and model
spowner	FM (farm owned)	Sprayer owner
sptest	FALSE	Testing of sprayer as part of a sprayer testing

		scheme
sd1	85	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	7.5	Typical sprayer speed
main tank capacity	1000	(L)
auxillary tank capacity	10	(L)
hand wash capacity	8	(L)
sd5	2	Boom width (m)
age	12	Sprayer age (y)
m & l time	0.5	Mixing and loading time on each load (h)
m & l/day	4	Mixing and loading events in a day
cleaning time	0.5	Average time spent cleaning sprayer (h)
cleaning/yr	3	Average number times sprayer cleaned in a year
spno	02	Farm sprayer number
sp1	HD (hydraulic boom (downwards))	Sprayer type
spname	PYTHAGORAS	Manufacturers name and model
spowner	FM (farm owned)	Sprayer owner
sptest	FALSE	Testing of sprayer as part of a sprayer testing scheme
sd1	15	Percentage of farm spraying carried out with this sprayer
sd2	1	Number of farms the sprayer is used
sd3	10	Typical sprayer speed
main tank capacity	500	(L)
auxillary tank capacity	0	(L)
hand wash capacity	0	(L)
sd5	1	Boom width (m)
age	5	Sprayer age (y)
m & l time	0.5	Mixing and loading time on each load (h)
m & l/day	4	Mixing and loading events in a day
cleaning time	0.5	Average time spent cleaning sprayer (h)
cleaning/yr	3	Average number times sprayer cleaned in a year

(a): December 2014 download data

Table 61: PPE used by the principal operator in GR case study during spraying and worker activities (Form 4)

optype	opm_app	description	ppetype	description	ppenum
AP	BA	Pesticide application (Broadcast air assisted)	C5	Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
AP	BA	Pesticide application (Broadcast air assisted)	GN	Gloves - Nitrile	1
AP	BA	Pesticide application (Broadcast air assisted)	RB	Rubber boots	1
AP	BA	Pesticide application (Broadcast air assisted)	RF	Respirator - Full face mask	1
CL	CL	Cleaning the sprayer	C5	Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
CL	CL	Cleaning the sprayer	GN	Gloves - Nitrile	1

CL	CL	Cleaning the sprayer	RB	Rubber boots	1
ML	ML	Mixing and loading (liquids)	C5	Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
ML	ML	Mixing and loading (liquids)	GN	Gloves - Nitrile	1
ML	ML	Mixing and loading (liquids)	RB	Rubber boots	1
ML	ML	Mixing and loading (liquids)	RF	Respirator - Full face mask	unknown
ML	MS	Mixing and loading (solids)	C5	Work wear: rainwear 2 piece (vinyl, Goretex etc.)	1
ML	MS	Mixing and loading (solids)	GN	Gloves - Nitrile	1
ML	MS	Mixing and loading (solids)	RB	Rubber boots	1
ML	MS	Mixing and loading (solids)	RF	Respirator - Full face mask	unknown
WA	FS	Worker activities (fertiliser spreading & spraying)	GR	Gloves - Non-specified rubber	unknown

(a): December 2014 download data

Table 62: Date and time spent by the principal operator in the GR case study on other worker activities (Form 6)

actdate	dte	activity	description	actual_crop	nhours
18/01/2013	-	FS	Fertiliser spreading & spraying	wine grapes	-
06/03/2013	-	FS	Fertiliser spreading & spraying	wine grapes	-

(a): December 2014 download data

3.4. Assessment of the collated data with regard to Environmental Risk Assessment

Data were extracted from the Capex2 database using SQL queries and data analysis was then performed using Microsoft Access and Excel statistical programs. The approach adopted divides the analysis into two complementary parts:

Analysis of the farm general practises in the use of PPPs

The general practises on the farms in their use of PPPs were analysed considering the size of the farms, their application of products and landscape management practises.

When PPP application was investigated, whether the farms surveyed were using an agronomist to advise on pesticide use (Form 2, question f), if they were practising Integrated Pest Management (IPM) on the farm (Form 2, question h) and the range of IPM practices they follow (Form 2, questions h_{a-h}) were taken into account.

Analysis of whether the environmental fields had permanent/temporary watercourses adjacent to them and whether the farm used buffer strips/windbreaks to prevent drift were also performed (Form 2, question g_{1-5}).

Farm detailed practises in the use of PPPs

Analysis of the specific practises in the use of PPPs using the detailed data concerning the environmental fields was performed in an attempt to identify whether patterns of usage could be identified based on the crop cultivated, the country and the size of the farm. In particular these data considered the landscape management undertake on farms:

- Regarding the application, it was taken into consideration for each field, the average number of PPPs applied in 2013 per hectare (broken down by chemical class) and the period when the application was made (broken down by month) to demonstrate complete scenarios of exposure pattern/pesticides that are applied over a full year (2013). Data were obtained by analysing the results from Form 3 (part a) of the questionnaire.

- Regarding landscape management, the type, size and width of the different in/off-field margins identified were taken into consideration. For the analysis data from Form 2 (questions g_{1-5}) and Form 3 (part b) of the questionnaire were used.

3.4.1. Analysis of the farm general practises in the use of PPPs

As shown in Table 63, the use of an agronomist (or professional advisor) to advise on pesticide use and the adoption of IPM practises are commonly adopted by almost every farm in most of the countries where the surveys were performed. However, in LT and PL the values are lower with LT and PL farmers using an agronomist (or personal advisors) are respectively 74 and 59 %. Furthermore, in LT, the use of IPM by farmers is lower than all the other countries at 77%.

In Table 63 information are presented about the range of IPM practises farmers tend to follow. Results seem to be quite different depending on the country. Indeed, the "selection of PPPs to minimise risk to beneficial parasites & predators" is widely used in most of the countries (especially in ES, IT, NL, PL and UK). On the other hand, still very common is: the "use of predictive models/early warning system" (especially in BE, IT and NL), the "use of monitoring traps" (especially in GR), crop rotation (especially in BE, LT and NL) and the selection of resistant varieties (especially in NL).

Furthermore, it is interesting to see that the use of biological control agents is not common with the exception of ES.

Table 63: Percentage of farms per country implementing IPM practises

Country	N	% using agronomist	% IPM	% IPM practises applied							
				a	b	c	d	e	f	g	others
BE	37	100	97	95	59	19	11	84	43	49	16
ES	60	100	88	32	62	67	42	62	87	87	0
GR	72	99	100	36	26	85	0	4	8	31	17
IT	81	98	90	32	54	64	26	81	28	88	44
LT	31	74	77	68	39	0	0	35	0	29	0
NL	29	97	100	100	83	45	21	83	45	79	34
PL	61	59	92	51	43	34	30	41	34	70	23
UK	45	98	100	64	60	69	9	60	73	80	98
Total	416	91	93	52	51	54	19	54	39	66	29

(a): N = number of farms surveyed; a = crop rotation; b = selection resistant varieties; c = monitoring traps; d = biological control agents; e = predictive models/early wearing system; f = maintain & increase beneficial population parasites & predators; g = selection pesticides to minimise risk to beneficial parasites & predator

(b): November 2014 download data

In Table 64 the particular situation of two countries (LT and PL) where the percentages of farmers using an agronomist (or professional advisor) and those practising IPM were lower than other countries is presented. In both of the countries it would appear that the size of the farm is directly affecting the use of an agronomist (or personal advisor) to advise on PPP use.

Table 64: Percentage of farms per size group and the crops cultivated in LT and PL implementing IPM practises

Country/size group/crop type	Using agronomist (professional advisor)	Practising IPM	N
LT	74	77	31
A	33	67	3
B	50	50	4
C	73	91	11
D	90	80	10
E	100	67	3
Annual crop	74	55	31
Permanent crop	0	0	0
PL	59	92	61
A	50	75	12
B	56	100	9
C	58	83	12
D	64	100	11
E	80	100	10
F	43	100	7
Annual crop	44	71	41
Permanent crop	90	95	20

(a): N = number of farms interviewed. Annual crops include combination of wheat, oilseed rape, sugar beet, potatoes and vegetables while permanent crop include apples.
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Furthermore, in some cases also the specific crop type seems to affect the business decisions of the farm. This is especially the case in PL where farms cultivating annual crops seem to be the main ones responsible for the lower values relating to the use of an agronomist and the practising of IPM (Table 65).

Table 65 and Table 66 show the presence of water courses as well as the presence of measures to prevent drift per country and per size group of the farm. Water courses are common among the farms surveyed especially in BE, NL and UK (in case of permanent water course) and in BE, IT, LT and UK (in case of temporary water course). On the other hand measures to prevent drift are not common, especially in ES, GR and PL. Furthermore, it is interesting to see that all the mitigation measures to mitigate risk included in the analysis seem to be directly affected by the dimension of the farms.

Table 65: Percentage of farms per country having water courses and implementing mitigation measures in their fields

Country	Water course		Measures to prevent drift			N
	Permanent	Temporary	Buffer strips	Windbreaks	In crop buffer strips	
BE	73	81	41	19	0	37
ES	0	12	17	5	7	60
GR	39	57	3	6	3	72
IT	47	72	58	38	6	81
LT	32	77	68	0	19	31
NL	86	52	93	3	10	29
PL	34	41	11	5	8	61
UK	69	78	93	47	29	45
Total	43	56	41	17	9	416

(a): N = number of farms interviewed.
(b): November 2014 download data

Table 66: Percentage of farms per group size having water courses and implementing mitigation measures in their fields

Country	Water course		Measures to prevent drift			N
	Permanent	Temporary	Buffer strips	Windbreaks	In crop buffer strips	
A	35	50	30	8	6	104
B	34	48	36	15	8	88
C	53	58	48	23	10	99
D	49	62	46	21	11	71
E	44	72	51	21	12	43
F	73	82	45	18	18	11
TOTAL	43	56	41	17	9	416

(a): N = number of farms interviewed.
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.2. Detailed farm practises in the use of PPP

To give a complete overview, Table 67 and Table 68 provide information on the average number of products applied to each crop in 2013 per hectare, broken down by chemical class and by periods of applications. To be consistent in the statistical analysis, only the crops with the highest number of environmental field surveyed are considered (apples, oranges, potatoes, rape seed, sugar beet, tomatoes, wheat and wine grapes).

Data considering the number of applications could have been presented based on products, formulated mixtures and/or active substances. The data in Table 67 and subsequent tables was analysed and presented on a product basis. The use of active substance would artificially increase the number of applications when products that contain more than one active substance are considered. Formulated mixtures would artificially reduce the number of applications when products that contain the same active ingredient(s) are considered. Presentation of the data on a product basis was considered a compromise for the data analysis, should alternative comparisons be required the generated database can be interrogated to provide these data.

In general, among the crops considered, apples (29) followed by wine grapes (17), tomatoes (16), potatoes (15) and sugar beet (14) required the most product applications in 2013.

Table 67: Average number of products applied in 2013 per hectare (broken down by chemical class and per crop)

Crops	N	Average number of applications (%)					Total average number of applications
		Fu	Gr	He	In	Other	
Apples	56	71	4	8	13	4	29
Maize	66	0	0	85	11	5	4
Oranges	32	11	2	19	54	14	4
Potatoes	58	67	1	22	9	2	15
Rape seed	41	31	0	35	25	10	8
Sugar beet	40	7	0	83	4	5	14
Tomatoes	40	52	1	27	16	5	16
Wheat	71	44	15	30	5	6	6
Wine grapes	60	81	0	4	13	3	17

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): November 2014 download data

Table 68 shows for each crop the different distributions of the product applications during the months of the year. While almost every crop has the majority of the application during May to June, the exception was potatoes where applications are more focused later in the year (July and August).

Table 68: Average number of products applied in 2013 per hectare (broken down by month of application and per crop) in all the environmental fields characterised in the survey

Crops	**N**	**Average number of applications (%) per month**														**Total average number of applications**
		J	F	M	A	M	J	J	A	S	O	N	D	#	(blank)	
Apples	56	0	0	1	18	35	22	15	6	1	0	1	0	0	0	29
Maize	66	0	0	0	11	23	57	5	2	0	0	0	0	2	0	4
Oranges	32	0	2	10	4	14	22	13	9	7	8	2	0	8	0	4
Potatoes	58	0	0	0	3	13	21	27	25	10	0	0	0	0	0	15
Rape seed	41	3	1	1	11	20	18	4	5	15	9	8	3	2	0	8
Sugar beet	40	0	0	1	17	49	24	2	4	1	1	0	0	1	0	14
Tomatoes	40	0	0	0	12	24	35	20	8	2	0	0	0	0	0	16
Wheat	71	0	0	1	13	33	24	4	1	6	8	4	0	6	0	6
Wine grapes	60	0	1	3	12	26	27	20	11	0	0	0	0	0	0	17

(a): N = number of environmental fields
(b): November 2014 download data

These data need to be considered very carefully because environmental conditions, country scenarios and specific crops issues can impact the situation. Therefore information relating to the main crops surveyed as environmental fields are provided below.

3.4.3. Apples

Table 69 shows the average number of products applied in 2013 (29) broken down by the different chemical classes. As demonstrated PL seems to have the lowest number of products applied in 2013 (25 against the 33 of IT and UK). On the other hand the percentages among the chemical classes are very similar with the exception of herbicides which are used more in PL (15% against 3% in IT and 5% in UK). Also the size of the farm seems to impact the use of PPPs. The small farms (size group A) used on average 19 products in 2013 against the 29-32 of the bigger farm size groups.

Table 69: Average number per hectare of products applied per chemical class for apples

Apples		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		56	71	4	8	13	4	29
Country	IT	16	70	3	3	12	12	33
	PL	20	70	0	15	14	1	25
	UK	20	72	8	5	14	0	33
Size group	A	6	73	0	13	12	1	19
	B	11	69	2	9	15	4	29
	C	18	70	5	6	15	4	30
	D	11	72	5	8	12	3	32
	E	10	72	5	7	11	5	30

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 70 shows when these products have been applied during the year. In this case differences could be detected only between countries. Indeed while in IT the most applications of products occur in April and May, in PL and UK the most applications occur in May and June.

Table 70: Average number per hectare of products applied per month for apples

Apples		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		56	0	0	1	18	35	22	15	6	1	0	1	0	0	29
Country	IT	16	0	0	1	27	41	13	13	5	0	0	0	0	0	33
	PL	20	0	0	0	14	36	26	12	8	3	0	0	0	0	25
	UK	20	0	0	3	14	28	27	20	5	1	1	2	0	0	33

Size group	A	6	0	0	0	12	40	21	20	5	1	1	0	0	0	19
	B	11	0	0	2	20	31	24	13	6	1	1	2	0	0	29
	C	18	0	0	1	19	35	23	15	5	1	0	0	0	0	30
	D	11	0	0	1	16	35	22	15	7	2	0	1	0	0	32
	E	10	0	0	2	20	33	22	15	6	2	0	0	0	0	30

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

When landscape management is considered, Table 71, Table 72 and Table 73 demonstrate that very different situations arise dependent on the country and the size of the farm.

In UK most of the off-field margins are comprised of Wind break (58%) followed by Woodland (10%) and Hedgerow (14%). On the other hand the in-field margins are comprised of Neutral regenerating margin (77%, with an average width of 4.38 m) and Shown or planned margin (20% with an average width of 1.25 m).

In IT most of the off-field margins are comprised of Other fields (53%) and Roads/other artificial structures (29%). On the other hand the in-field margins are comprised of No margin (52%), Natural regenerating margin (31% with an average width of 0.84 m) and Herbaceous (17% with an average width of 0.42 m).

In PL most of the off-field margins are comprised of Other field and Orchard (both at 43%). On the other hand the in-field margins are comprised of No margin (67%) and Natural regenerating margin (28% with an average width of 0.41 m).

Table 71: Average percentage of off-field margins for environmental fields for apples

Apples	**N**	**Types of off-field margins**									
		FI	**HD**	**OF**	**OR**	**PA**	**RO**	**TR**	**WB**	**WO**	**Others**
Total	56	2	5	31	17	0	10	0	21	6	8
IT	16	0	0	53	0	0	29	0	1	2	15
PL	20	0	0	43	43	0	4	0	0	4	5
UK	20	5	14	0	5	0	1	0	58	10	6
A	6	0	1	54	24	0	12	0	0	1	8
B	11	9	17	36	18	0	7	0	4	4	5
C	18	0	1	23	13	0	10	0	38	6	9
D	11	0	7	26	20	0	12	0	23	5	8
E	10	0	0	29	18	0	12	0	20	11	11

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 72: Average percentage of in-field margins for environmental fields for apples

Apples	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	56	4	0	11	29	49	6	1
IT	16	17	0	33	22	28	0	0
PL	20	0	0	6	48	45	0	0
UK	20	0	0	0	9	70	17	4
A	6	0	0	25	13	63	0	0
B	11	0	0	7	33	47	7	7
C	18	9	0	5	23	55	9	0
D	11	6	0	13	38	38	6	0
E	10	0	0	18	36	45	0	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): March 2015 download data

Table 73: Average width (m) of in-field margins in the environmental fields for apples

Apples	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	56	3.06	0	2.48	0	3.87	6.33	5.0	3.81
IT	16	3.06	0	2.48	0	2.93	0	0	2.76
PL	20	0	0	-	0	1.67	0	0	1.67
UK	20	0	0	0	0	5.71	6.33	5.0	5.81
A	6	0	0	2.0	0	1.93	0	0	1.94
B	11	0	0	0	0	3.67	6.0	5.0	3.95
C	18	2.92	0	3.5	0	4.64	6.2	0	4.5
D	11	3.50	0	2.67	0	3.78	7	0	3.74
E	10	0	0	0	2.17	5.22	0	0	4.03

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): March 2015 download data
(d): - = No width data available

3.4.4. Maize

Table 74 shows the average number of products applied in 2013 (4) broken down (by percentages) in the different chemical classes. PL (1) appears to have a lower number of products applied than BE (4) and IT (5). On the other hand the percentages among the chemical classes seem very similar with the exception of insecticides which are more frequently used in IT (24%) than BE (0%) and PL(3%). For maize, the size of the farm does not seem to affect the use of PPPs.

Table 74: Average number per hectare of products applied per chemical class for apples

Maize		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		66	0	0	85	11	4	4
Country	BE	25	0	0	99	0	1	4
	IT	21	0	0	67	24	9	5
	PL	20	0	0	96	3	0	1
Size group	A	10	0	0	79	4	17	2
	B	9	0	0	98	2	0	6
	C	20	0	0	89	10	1	4
	D	12	0	0	80	17	2	3
	E	8	0	0	66	22	11	4
	F	7	0	0	89	11	0	1

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 75 shows when products have been applied during the year. In the case of maize differences could be only be observed between countries. Indeed while in IT it seems there are a higher application of products in April, May and June (25%, 26% and 36%, respectively), in BE and PL the higher applications were in May and June (19% and 90% for BE, and 49% and 24% for PL, respectively).

Table 75: Average number per hectare of products applied per month for maize

Maize		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		66	0	0	0	11	23	57	5	2	0	0	0	0	2	4
Country	BE	25	0	0	0	0	13	90	0	0	0	0	0	0	0	4
	IT	21	0	0	0	24	26	36	11	3	0	0	0	0	0	5
	PL	20	0	0	0	7	49	24	0	3	0	0	0	0	17	1
Size group	A	10	0	0	0	29	42	29	0	0	0	0	0	0	0	2
	B	9	0	0	0	12	10	78	0	0	0	0	0	0	0	6
	C	20	0	0	0	4	25	67	3	1	0	0	0	0	0	4
	D	12	0	0	0	12	24	56	0	2	0	0	0	0	5	3
	E	8	0	0	0	11	17	44	25	3	0	0	0	0	0	4
	F	7	0	0	0	11	44	0	0	11	0	0	0	0	33	1

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)

(c): November 2014 download data

In relation to the landscape management, Table 76 shows a similar situation depending on the country and on the size of the farm in relation to the off-field margins. Indeed, in every country the most part of the off-field margin is on average comprised of Other fields (42%) and Roads and other artificial structures (21%). On the other hand, the situation about in-field margin is very different (Table 77 and Table 78): indeed while in BE and PL almost always have No margins (98% in BE and 79% in PL), in IT there is also the possibility of having Herbaceous margins (23% with an average width of 0.56 m) and Mixed margin types combined (19% with an average width of 0.49 m).

Table 76: Average percentage of off-field margins for environmental fields for maize

Maize	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	66	0	1	42	0	5	21	1	0	8	21
BE	25	0	0	40	1	12	24	0	0	9	15
IT	21	0	4	32	0	2	25	0	1	1	34
PL	20	1	0	54	0	0	14	4	0	13	14
A	10	0	1	55	0	3	18	0	0	2	22
B	9	2	1	22	2	7	29	0	0	12	25
C	20	0	1	39	0	10	27	1	1	3	17
D	12	0	1	40	0	5	19	1	0	7	26
E	8	0	4	44	0	1	19	6	0	9	18
F	7	0	0	56	0	0	4	0	0	21	19

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 77: Average percentage of in-field margins for environmental fields for maize

Maize	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	66	8	2	6	76	8	0	0
BE	25	2	0	0	98	0	0	0
IT	21	23	6	19	47	6	0	0
PL	20	0	0	0	79	22	0	0
A	10	18	12	0	70	0	0	0
B	9	0	0	0	87	13	0	0
C	20	0	0	10	83	7	0	0
D	12	21	0	8	58	13	0	0
E	8	13	0	13	71	4	0	0
F	7	0	0	0	83	17	0	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin

(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 78: Average width (m) of in-field margins in the environmental fields for maize

Maize	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	66	0.28	0.09	0.16	0.32	0.19	0	0	1.03
BE	25	0.26	0	0	0	0	0	0	0.26
IT	21	0.56	0.28	0.49	0.81	0.20	0	0	2.34
PL	20	0	0	0	0.20	0.42	0	0	0.62
A	10	0.26	0.59	0	0.30	0	0	0	1.15
B	9	0	0	0	0.53	0.46	0	0	0.99
C	20	0	0	0.28	0.24	0.09	0	0	0.61
D	12	1.03	0	0.17	0.28	0.34	0	0	1.81
E	8	0.43	0	0.35	0.64	0.08	0	0	1.49
F	7	0	0	0	0	0.26	0	0	0.26

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.5. Oranges

Table 79 shows the average number of products applied in 2013 (4) broken down (by percentages) by the different chemical classes. The average number of products applied between the two countries involved (ES and GR) are similar and differences can be found only in the percentages of the kind of products applied. While in ES it seems that Growth regulators (54%) are mainly used, in GR it is mainly Fungicides (76%). Also the size of the farm seems to be directly affecting the use of PPPs although the low number of farms involved in each size group cannot provide strong evidence.

Table 79: Average number per hectare of products applied per chemical class for oranges

Oranges		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		32	42	24	6	0	27	4
Country	ES	13	0	54	9	0	37	4
	GR	19	76	0	4	0	20	4
Size group	A	20	22	19	5	0	54	2
	B	6	34	23	0	0	43	5
	C	2	82	9	9	0	0	6
	D	3	43	43	14	0	0	12
	E	1	100	0	0	0	0	10

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide

(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 80 shows when these products are applied during the year. In this case there are differences between the two countries, while ES has the majority of applications in June (44%), GR has applications distributed more evenly through the year, although there is an amount of missing data.

Table 80: Average number per hectare of products applied per month for oranges

Oranges		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		32	0	2	10	4	14	22	13	9	7	8	2	0	8	4
Country	ES	13	0	0	7	0	14	44	7	12	5	7	4	0	0	4
	GR	19	0	4	13	7	14	4	19	6	9	9	1	0	14	4
Size group	A	20	0	5	5	10	7	32	5	5	0	5	2	0	24	2
	B	6	0	0	10	3	23	13	27	7	10	7	0	0	0	5
	C	2	0	9	18	0	18	9	18	18	9	0	0	0	0	6
	D	3	0	0	14	0	9	26	14	9	11	11	6	0	0	12
	E	1	0	0	10	0	30	10	0	20	10	20	0	0	0	10

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 81, Table 82 and Table 83 show the different situation depending on the country and on the size of the farm.

In ES the most part of the off-field margin is comprised by Other field (62%) followed by Roads and other artificial structures (32%). On the other hand the in-field margin is on average comprised mainly by No margin (81%).

In GR the most part of the off-field margin is comprised by Other field (43%) and Roads and other artificial structures (54%). On the other hand the in-field margins are comprised of No margin (70%) and Herbaceous (23% with an average width of 0.03 m).

Table 81: Average percentage of off-field margins for environmental fields for oranges

Oranges	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	32	0	1	51	0	0	45	0	0	0	3
ES	13	0	0	62	0	0	32	0	0	0	6
GR	19	0	2	43	0	0	54	0	0	0	2
A	20	0	2	53	0	0	43	0	0	0	3
B	6	0	0	46	0	0	50	0	0	0	4
C	2	0	0	30	0	0	70	0	0	0	0
D	3	0	0	48	0	0	42	0	0	0	10

E	1	0	0	80	0	0	20	0	0	0	0

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 82: Average percentage of in-field margins for environmental fields for oranges

Oranges	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	32	15	0	1	81	1	3	0
ES	13	4	0	0	96	0	0	0
GR	19	23	0	1	70	2	5	0
A	20	15	0	1	80	2	3	0
B	6	13	0	0	87	0	0	0
C	2	5	0	0	95	0	0	0
D	3	7	0	0	83	0	10	0
E	1	80	0	0	20	0	0	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 83: Average width (m) of in-field margins in the environmental fields for oranges

Oranges	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	32	0.11	0	0	5.64	0	0	0	5.76
ES	13	0.23	0	0	13.87	0	0	0	14.10
GR	19	0.03	0	0.01	0.01	0	0	0	0.05
A	20	0.01	0	0.01	4.72	0	0	0	4.74
B	6	0.52	0	0	11.17	0	0	0	11.68
C	2	0.15	0	0	6.50	0	0	0	6.65
D	3	0	0	0	2.02	0	0	0	2.02
E	1	0	0	0	0.04	0	0	0	0.04

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.6. Potatoes

Table 84 shows the average number of products applied in 2013 (15) broken down (by percentages) in the different chemical classes. In LT it seems that a lower number of products are applied in 2013 (4 against the 20 for BE and 26 for NL. Furthermore, the percentages among the chemical classes appear different: while in BE and NL most of the products applied are fungicides (74% and 63%, respectively), in LT the product usage is more distributed among fungicides, herbicides and insecticides (40%, 23% and 34%, respectively). Also the size of the farm seems to indirectly affect the use of PPPs.

Table 84: Average number per hectare of products applied per chemical class for potatoes

Potatoes		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		58	67	1	22	9	2	15
Country	BE	24	74	1	21	3	1	20
	LT	24	40	0	23	34	3	4
	NL	10	63	1	22	11	2	26
Size group	A	9	63	1	26	11	0	22
	B	16	69	1	20	6	3	18
	C	21	69	0	20	10	1	13
	D	9	68	2	21	8	1	12
	E	3	33	0	17	33	17	4

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 85 shows when the products are applied during the year. BE and NL have a similar distribution throughout the year, while LT appears to be more focused on applications in June (44% against the 16% of BE and the 21% of NL).

Table 85: Average number per hectare of products applied per month for potatoes

Potatoes		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		58	0	0	0	3	13	21	27	25	10	0	0	0	0	15
Country	BE	24	0	0	0	3	15	16	28	26	11	0	0	0	0	20
	LT	24	0	0	0	1	12	44	26	12	6	0	0	0	0	4
	NL	10	0	0	0	4	11	21	26	26	11	0	1	0	0	26
Size group	A	9	0	0	0	5	12	17	28	27	12	0	0	0	0	22
	B	16	0	0	0	3	13	20	29	26	8	0	1	0	0	18
	C	21	0	0	0	4	14	23	27	25	8	0	0	0	0	13
	D	9	0	0	0	0	15	23	26	18	18	0	0	0	0	12
	E	3	0	0	0	8	8	25	25	25	8	0	0	0	0	4

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 86, Table 87 and Table 88 show the situation depending on the country and on the size of the farm.

Table 86: Average percentage of off-field margins for environmental fields for potatoes

Potatoes	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	58	2	0	38	0	11	11	4	0	5	32
BE	24	0	0	34	0	12	20	0	0	6	27
LT	24	5	0	45	0	15	1	9	0	5	20
NL	10	0	0	28	0	3	14	0	0	0	70
A	9	0	0	42	0	7	11	0	0	1	33
B	16	0	0	30	0	7	12	3	0	7	54
C	21	0	0	41	0	15	10	8	0	6	20
D	9	7	0	43	0	14	14	0	0	0	22
E	3	23	0	20	0	17	10	0	0	5	25

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 87: Average percentage of in-field margins for environmental fields for potatoes

Potatoes	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	58	3	16	2	77	3	1	0
BE	24	0	0	0	100	0	0	0
LT	24	8	25	4	54	6	1	1
NL	10	0	35	0	80	0	0	0
A	9	0	15	0	79	0	0	0
B	16	2	13	0	91	5	0	2
C	21	4	12	0	83	1	0	0
D	9	0	27	0	64	6	4	0
E	3	27	40	33	0	0	0	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 88: Average width (m) of in-field margins in the environmental fields for potatoes

Potatoes	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	58	0.07	0.23	0.03	0.88	0.02	0.12	0.01	1.36
BE	24	0	0	0	0	0	0	0	0
LT	24	0.16	0.13	0.08	0	0.04	0.28	0.03	0.72
NL	10	0	1.03	0	5.10	0	0	0	6.13
A	9	0	0.44	0	0	0	0	0	0.44
B	16	0.01	0.40	0	0	0.03	0	0.05	0.48
C	21	0.12	0.06	0	2.43	0.02	0	0	2.62
D	9	0	0.13	0	0	0.03	0.75	0	0.91
E	3	0.43	0.20	0.62	0	0	0	0	1.25

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.7. Rape seed

Table 89 shows the average number of products applied in 2013 (8) broken down (by percentages) by chemical class. LT seems to have a lower number of products (4) applied in 2013 than the UK (12). Furthermore, the percentages among the chemical classes are different. Indeed although in both countries there is a similar use of herbicides (38% in LT and 33% in UK), in UK there is the prevalence of fungicides (31%) while in LT insecticides (43%) prevail. The size of the farm seems to affect the use of PPPs directly in the case of fungicides.

Table 89: Average number per hectare of products applied per chemical class for rape seed

Rape seed		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		41	31	0	35	25	9	8
Country	LT	21	16	0	38	43	2	4
	UK	20	37	0	33	19	12	12
Size group	A	1	0	0	100	0	0	1
	B	4	40	0	33	20	9	8
	C	9	28	0	35	27	10	8
	D	17	27	0	37	28	9	7
	E	8	34	0	32	24	9	8
	F	2	41	0	34	16	10	16

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 90 shows when these products have been applied throughout the year. In this case differences could be seen between the countries. Indeed while in UK the distribution seems to be more homogenous among months, in LT almost every application is made in May (37%) and June (41%).

Table 90: Average number per hectare of products applied per month for rape seed

Rape seed		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		41	3	1	1	11	20	18	4	5	15	9	8	3	2	8
Country	LT	21	0	0	0	6	37	41	7	5	5	0	0	0	0	4
	UK	20	4	1	1	13	14	10	3	5	19	12	11	4	2	12
Size group	A	1	0	0	0	0	100	0	0	0	0	0	0	0	0	1
	B	4	0	3	0	10	17	13	0	0	23	9	2	13	10	8
	C	9	3	3	0	8	24	17	7	9	13	6	4	4	1	8
	D	17	2	1	1	9	24	17	6	5	17	11	5	2	1	7
	E	8	3	1	2	12	9	24	3	3	19	10	15	0	1	8
	F	2	6	0	0	22	16	13	0	6	8	3	26	0	0	16

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 91, Table 92 and Table 93 show the situation depending on the country and on the size of the farm.

In UK the most part of the off-field margins are comprised by Other field (21%) followed by Pasture (11%) and Roads and other artificial structures (9%) and Track (9%). The in-field margins are comprised of Neutral regenerating margin (55% with an average width of 1.59 m), Sown or planted margin (22% with an average width of 1.59 m) and No margin (18%).

In LT most of the off-field margins are comprised of Other field (37%) and Pasture (22%). On the other hand the infield margins us on average composed by No margin (34%), The in-field margins are comprised of In crop margin (28% with an average of 0.14 m), Natural regenerating margin (20% with an average width of 0.21 m) and Herbaceous margin (16% with an average width of 0.14 m).

Table 91: Average percentage of off-field margins for environmental fields for rape seed

Rape seed	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	41	1	6	21	0	11	9	9	0	1	41
LT	21	2	0	37	0	22	7	11	0	2	17
UK	20	0	13	4	0	0	11	6	0	1	66
A	1	0	0	40	0	50	0	10	0	0	0
B	4	0	0	13	0	11	27	0	0	0	50
C	9	0	0	27	0	16	3	13	0	4	37
D	17	3	8	24	0	10	11	10	0	0	34
E	8	0	16	14	0	8	0	6	0	3	54
F	2	0	0	0	0	0	25	13	0	0	63

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 92: Average percentage of in-field margins for environmental fields for rape seed

Rape seed	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	41	10	14	0	26	37	12	0
LT	21	16	28	0	34	20	3	0
UK	20	5	0	0	18	55	22	0
A	1	0	90	0	10	0	0	0
B	4	26	0	0	24	46	4	0
C	9	4	16	0	35	21	24	0
D	17	13	17	0	22	45	4	0
E	8	9	8	0	24	48	11	0
F	2	0	0	0	38	0	63	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 93: Average width (m) of in-field margins in the environmental fields for rape seed

Rape seed	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	41	0.29	0.08	0	0.09	0.86	0.90	0	2.21
LT	21	0.47	0.14	0	0	0.16	0.21	0	0.97
UK	20	0.10	0.01	0	0.18	1.59	1.63	0	3.51
A	1	0	0.45	0	0	0	0	0	0.45
B	4	0.58	0	0	0	1.21	1.88	0	3.67
C	9	0.13	0.11	0	0	0.83	1.32	0	2.38
D	17	0.34	0.08	0	0	0.52	0.18	0	1.12
E	8	0.31	0.04	0	0	1.75	0.74	0	2.84
F	2	0	0	0	1.75	0	4.38	0	6.13

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.8. Sugar beet

Table 94 shows the average number of products applied in 2013 (14) broken down by the different chemical classes. As the table shows there is a similar number of chemical product applied in 2013 (15 in BE and 12 in UK). Furthermore, the percentages among the chemical classes are similar although in UK there is a higher use of fungicides and insecticides (11% and 9%, respectively) than in BE (4% and 1%, respectively). The size of the farm seems to directly affect the use of insecticides.

Table 94: Average number per hectare of products applied per chemical class for sugar beet

Sugar beet		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		40	7	0	83	4	5	14
Country	BE	20	4	0	88	1	6	15
	UK	20	11	0	77	9	3	12
Size group	A	4	6	0	82	2	10	12
	B	8	7	0	81	3	9	15
	C	11	5	0	90	1	3	14
	D	9	7	0	82	6	4	14
	E	5	13	0	76	8	3	12
	F	3	9	0	79	12	0	14

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 95 shows when these during the year products are applied. The distribution of applications through the year for the two countries would appear similar although in BE there is a higher percentage of PPPs applied (55% versus the 41% of UK).

Table 95: Average number per hectare of products applied per month for sugar beet

Sugar beet		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		40	0	0	1	17	49	24	2	4	1	1	0	0	1	14
Country	BE	20	0	0	0	15	55	24	2	4	0	0	0	0	0	15
	UK	20	0	0	2	20	41	25	2	5	1	1	1	0	2	12
Size group	A	4	0	0	0	14	67	16	0	2	0	0	0	0	0	12
	B	8	0	0	0	13	56	23	0	5	0	0	0	0	3	15
	C	11	0	0	1	18	55	21	1	5	1	0	0	0	0	14
	D	9	0	1	0	17	38	33	4	4	1	2	1	0	1	14
	E	5	0	0	0	27	39	18	5	5	2	2	2	0	2	12
	F	4	0	0	0	14	67	16	0	2	0	0	0	0	0	12

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 96, Table 97 and Table 98 show the situation depending on the country and on the size of the farm.

In BE the most part of the off-field margin comprised of Other fields (41%) and Roads and other artificial structures (22%). While the in-field margin is comprised of Neutral regenerating margin (77% with an average width of 4.38 m) and Sown or planted margin (20% with an average width of 1.25 m).

In UK the most part of the off-field margin is comprised of Hedgerow (17%) and Roads and other artificial structures (13%). While the in-field margins are comprised of No margin (52%), Natural regenerating margin (31% with an average width of 0.84 m) and Herbaceous margin (17% with an average width of 0.42 m).

Table 96: Average percentage of off-field margins for environmental fields for sugar beet

Sugar beet	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	40	3	9	22	0	3	18	2	0	3	41
BE	20	2	0	41	0	7	22	0	0	3	25
UK	20	5	17	4	0	0	13	4	0	2	56
A	4	0	0	23	0	0	8	4	0	0	65
B	8	0	3	24	0	6	27	6	0	1	34
C	11	4	5	32	0	4	17	0	0	6	33
D	9	0	9	24	0	4	15	0	0	3	44
E	5	16	23	0	0	0	16	3	0	0	44
F	3	5	26	13	0	0	17	0	0	0	39

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 97: Average percentage of in-field margins for environmental fields for sugar beet

Sugar beet	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	40	3	0	0	60	27	9	1
BE	20	0	0	0	100	0	0	0
UK	20	5	0	0	20	55	19	2
A	4	0	0	0	88	13	0	0
B	8	13	0	0	69	19	0	0
C	11	0	0	0	85	9	6	0
D	9	0	0	0	47	42	11	0
E	5	0	0	0	9	83	10	0
F	3	0	0	0	35	0	51	13

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 98: Average width (m) of in-field margins in the environmental fields for sugar beet

Sugar beet	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	40	0.08	0	0	0	0.49	0.72	0.06	1.35
BE	20	0	0	0	0	0	0	0	0
UK	20	0.15	0	0	0	0.98	1.45	0.12	2.69
A	4	0	0	0	0	0.13	0	0	0.13
B	8	0.38	0	0	0	0.19	0	0	0.56
C	11	0	0	0	0	0.09	1.07	0	1.16
D	9	0	0	0	0	1.08	0.33	0	1.42
E	5	0	0	0	0	1.36	0.70	0	2.06
F	3	0	0	0	0	0	3.54	0.80	4.34

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.9. Tomatoes

Table 99 shows the average number of products applied in 2013 (16) broken down (by percentages) in the different chemical classes. GR appears to have a lower number of products applied in 2013 (12) than IT (20). Furthermore, the percentages among the chemical classes are different especially for herbicides (14% in GR, 34% in IT) and insecticides (31%in GR, 7% of IT). On the other hand the size of the farm do not seems to affect the use of PPPs.

Table 99: Average number per hectare of products applied per chemical class for tomatoes

Tomatoes		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		40	52	1	27	16	4	16
Country	GR	20	55	0	14	31	0	12
	IT	20	50	2	34	7	7	20
Size group	A	14	52	2	19	22	5	13
	B	7	58	0	29	11	0	12
	C	7	50	0	30	13	7	17
	D	6	50	3	34	9	4	20
	E	6	48	1	28	18	5	17

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 100 shows when the products have been applied during the year. Differences were observed between countries, in GR applications are mainly made in three months of April, May and June, while in IT they are mainly distributed from April to August.

Table 100: Average number per hectare of products applied per month for tomatoes

Tomatoes		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		40	0	0	0	12	24	35	20	8	2	0	0	0	0	16
Country	GR	20	0	0	0	10	38	46	6	0	0	0	0	0	0	12
	IT	20	0	0	0	13	14	29	28	13	3	0	0	0	0	20
Size group	A	14	0	0	0	7	35	40	11	6	1	0	0	0	0	13
	B	7	0	0	0	20	20	28	26	6	0	0	0	0	0	12
	C	7	0	0	0	12	16	30	25	11	5	0	0	0	0	17
	D	6	0	0	0	13	16	33	25	11	2	0	0	0	0	20
	E	6	0	0	0	15	26	40	15	4	1	0	0	0	0	17

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 101, Table 102 and Table 103 shows the situation depending on the country and on the size of the farm.

Table 101: Average percentage of off-field margins for environmental fields for tomatoes

Tomatoes	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	40	1	2	37	1	0	30	0	0	1	29
GR	20	0	0	41	1	0	34	0	0	0	24
IT	20	2	5	33	0	0	25	0	0	2	34
A	14	0	1	50	2	0	25	0	0	1	20
B	7	0	4	14	0	0	29	0	0	0	53
C	7	0	3	31	0	0	48	0	0	1	17
D	6	6	0	47	0	0	15	0	0	2	31
E	6	0	5	28	0	0	35	0	0	0	33

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 102: Average percentage of in-field margins for environmental fields for tomatoes

Tomatoes	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	40	8	3	0	31	58	0	1
GR	20	0	0	0	4	95	0	1
IT	20	15	5	0	59	22	0	0
A	14	7	0	0	20	71	0	1
B	7	0	14	0	43	43	0	0
C	7	29	0	0	14	57	0	0
D	6	0	0	0	49	51	0	0
E	6	0	0	0	46	54	0	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 103: Average width (m) of in-field margins in the environmental fields for tomatoes

Tomatoes	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	40	0.16	0.13	0	0.61	0.44	0	0.02	1.35
GR	20	0	0	0	0.01	0.24	0	0.03	0.28
IT	20	0.31	0.25	0	1.22	0.65	0	0	2.43
A	14	0.14	0	0	0.29	0.20	0	0.04	0.67
B	7	0	0.71	0	0.73	0.10	0	0	1.54
C	7	0.60	0	0	0.29	0.64	0	0	1.53
D	6	0	0	0	1.06	1.31	0	0	2.37
E	6	0	0	0	1.17	0.33	0	0	1.50

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.10. Wheat

Table 104 shows the average number of products applied in 2013 (6) broken down (by percentages) by the different chemical classes. In UK a higher number of products are applied (13) when compared to LT (4) and PL (4). The percentages of chemical classes are different, in PL and UK fungicides are the most used (respectively 47% and 45%), in LT the most used are Herbicides (40%). Furthermore, the size of the farm does not appear to affect the use of PPP.

Table 104: Average number per hectare of products applied per chemical class for wheat

Wheat		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		71	44	15	30	5	8	6
Country	LT	26	29	17	40	8	6	4
	PL	23	45	23	27	6	2	4
	UK	22	47	10	28	6	9	13
Size group	A	5	32	18	32	9	9	4
	B	9	37	11	39	5	8	7
	C	18	43	13	29	8	7	7
	D	19	40	15	31	7	7	8
	E	11	53	15	22	8	12	5
	F	9	46	16	33	3	3	8

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 105 shows when these products have been applied during the year. In this case differences could be detected between countries although the relevant number of missing in information in PL do not allow a full consideration of the data.

Table 105: Average number per hectare of products applied per month for wheat

Wheat		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		71	0	0	1	13	33	24	4	1	6	8	4	0	6	6
Country	LT	26	0	0	0	2	44	33	4	4	11	2	0	0	0	4
	PL	23	0	0	2	19	35	17	2	0	1	3	5	0	26	4
	UK	22	0	1	0	16	26	24	4	0	5	17	5	0	1	13
Size group	A	5	0	0	0	14	45	14	0	0	0	14	5	0	9	4
	B	9	0	0	2	18	24	31	5	0	5	8	0	0	8	7
	C	18	0	0	0	7	36	30	6	3	4	11	4	0	0	7
	D	19	1	1	0	7	35	24	2	1	7	13	5	0	4	8
	E	11	0	0	0	31	28	28	2	0	3	9	5	0	0	5
	F	9	0	0	3	14	26	10	4	1	9	9	4	0	20	8

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 106, Table 107 and Table 108 show the situation depending on the country and on the size of the farm.

Table 106: Average percentage of off-field margins for environmental fields for wheat

Wheat	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	71	2	4	34	0	7	8	7	0	4	35
LT	26	0	0	38	0	17	9	12	0	4	20
PL	23	6	0	56	0	0	8	4	0	6	20
UK	22	0	13	6	0	1	7	5	0	2	67
A	5	26	0	29	0	0	0	0	0	4	39
B	9	0	0	44	0	3	6	11	0	2	34
C	18	0	3	26	0	14	9	9	0	5	33
D	19	0	11	29	0	6	9	10	0	2	32
E	11	0	0	32	0	5	10	4	0	4	45
F	9	0	0	52	0	3	7	0	0	8	31

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 107: Average percentage of in-field margins for environmental fields for wheat

Wheat	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	71	8	6	0	49	28	8	1
LT	26	21	16	1	46	13	2	2
PL	23	0	0	0	86	13	0	0
UK	22	1	0	0	14	62	23	0
A	5	0	0	0	74	19	5	0
B	9	10	0	0	57	31	0	2
C	18	13	9	1	41	25	8	2
D	19	10	9	0	43	33	4	0
E	11	6	6	0	31	44	13	0
F	9	0	0	0	76	8	17	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 108: Average width (m) of in-field margins in the environmental fields for wheat

Wheat	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	71	0.29	0.05	0	0.13	0.62	0.42	0.01	1.53
LT	26	0.58	0.15	0	0	0.15	0.17	0.04	1.08
PL	23	0.02	0	0	0.41	0.23	0	0	0.66
UK	22	0.25	0	0	0	1.57	1.16	0	2.98
A	5	0	0	0	0.12	0.19	0.30	0	0.61
B	9	0.20	0	0	0.67	0.86	0	0.07	1.79
C	18	0.32	0.15	0	0	0.64	0.47	0.02	1.59
D	19	0.32	0.04	0	0.14	0.71	0.22	0	1.44
E	11	0.65	0.03	0	0	0.82	0.85	0	2.35
F	9	0	0	0	0	0.11	0.72	0	0.83

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

3.4.11. Wine grapes

Table 109 shows the average number of products applied in 2013 (17) broken down (by percentages) in the different chemical classes. In ES a much lower number of products were applied in 2013 (6) when compared to GR (22) and IT (26). The percentages among the chemical classes seems similar between ES and GR while in IT there is more use of fungicides (89%) than in ES (70%) and GR (72%). The size of the farm does not seem to affect the use of PPPs.

Table 109: Average number per hectare of products applied per chemical class for wine grapes

Wine grapes		N	Percentage of each chemical class					Total average number per hectare
			Fu	Gr	He	In	Other	
Total		60	81	0	4	13	3	17
Country	ES	20	70	0	0	29	1	6
	GR	20	72	0	9	19	0	22
	IT	20	89	0	2	5	5	26
Size group	A	10	83	0	2	14	2	17
	B	26	80	0	5	13	2	19
	C	12	73	0	6	19	3	18
	D	8	84	0	3	8	5	17
	E	4	86	0	3	10	1	19

(a): N = number of environmental fields; Fu = fungicide; Gr = growth regulator; He = herbicide; In = insecticide
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 110 shows when these products have been applied during the year. Differences could be detected between countries, in IT and ES the distribution could be considered similar being mainly concentrated in May, June and July, in GR it starts early in April.

Table 110: Average number per hectare of products applied per month for wine grapes

Wine grapes		N	Percentage of products applied in each month												Total average number per hectare
			J	F	M	A	M	J	J	A	S	O	N	D	Unknown	
Total		60	0	1	3	12	26	27	20	11	0	0	0	0	0	17
Country	ES	20	0	2	1	1	30	26	18	20	2	0	0	0	0	6
	GR	20	0	1	6	23	19	23	19	8	0	0	0	0	0	22
	IT	20	0	0	1	6	29	30	24	10	0	0	0	0	0	26
Size group	A	10	0	0	3	9	32	23	20	12	1	0	0	0	0	17
	B	26	0	2	3	14	22	28	20	10	1	0	0	0	0	19
	C	12	0	0	4	15	26	25	21	9	0	0	0	0	0	18
	D	8	0	0	2	9	21	27	29	11	0	0	0	0	0	17
	E	4	0	0	3	4	26	27	33	7	0	0	0	0	0	19
	F	10	0	0	3	9	32	23	20	12	1	0	0	0	0	17

(a): N = number of environmental fields
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

In relation to the landscape management, Table 111, Table 112 and Table 113 show the situation depending on the country and on the size of the farm.

In ES most of the off-field margin is comprised of Other field (78%) and Road and other artificial structures (13%). The in-field margin is mainly comprised by No margin (85%).

In GR most of the off-field margin is comprised of Other field (77%) followed by Roads and other artificial structures (21%). The in-field margins consist mainly of No margin (99%).

In IT most of the off-field margin is comprised of Other field (41%) followed by Roads and other artificial structures (21%). The in-field margins consist mainly of No margin (50%) and Natural regenerating margin (36% with an average width of 1.15 m).

Table 111: Average percentage of off-field margins for environmental fields for wine grapes

Wine grapes	N	Types of off-field margins									
		FI	HD	OF	OR	PA	RO	TR	WB	WO	Others
Total	60	0	1	65	0	0	18	0	1	2	11
ES	20	0	0	78	0	0	13	0	0	0	9
GR	20	0	0	77	0	0	21	0	0	0	2
IT	20	0	4	41	1	1	21	0	2	5	22
A	10	0	1	53	2	0	13	0	0	1	31
B	26	0	0	69	0	0	24	0	0	0	6
C	12	0	0	75	0	0	16	0	0	1	1
D	8	0	8	67	0	0	13	0	3	2	8
E	4	0	1	36	0	0	14	0	0	17	32

(a): N = number of environmental fields; FI = Arable field; HD = Hedgerow; OF = Other field; OR = Orchard; PA = Pasture; RO = Roads and other artificial structures; TR = track, drove etc; WB = Wind break; WO = Woodland, spinneys, copses, forests etc
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 112: Average percentage of in-field margins for environmental fields for wine grapes

Wine grapes	N	Types of in-field margins						
		HM	IC	MM	NM	NR	SM	Others
Total	60	4	1	2	78	14	1	0
ES	20	5	0	5	85	5	0	0
GR	20	0	0	1	99	0	0	0
IT	20	7	2	1	50	36	2	0
A	10	0	0	2	78	20	0	0
B	26	4	0	4	85	8	0	0
C	12	0	0	1	92	1	0	0
D	8	13	0	0	50	38	0	0
E	4	8	8	0	50	25	8	0

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

Table 113: Average width (m) of in-field margins in the environmental fields for wine grapes

Wine grapes	N	Types of in-field margins							Total average (m)
		HM	IC	MM	NM	NR	SM	Others	
Total	60	0.29	0.02	0.84	4.73	0.72	0.02	0	6.61
ES	20	0.65	0	2.50	13.80	1.00	0	0	17.95
GR	20	0	0	0	0	0	0	0	0
IT	20	0.21	0.05	0.03	0.40	1.15	0.05	0	1.88
A	10	0	0	0	5.20	0.66	0	0	5.86
B	26	0.50	0	1.92	3.91	0.21	0	0	6.54
C	12	0	0	0.04	6.77	0.06	0	0	6.88
D	8	0.38	0	0	5.90	3.31	0	0	9.59
E	4	0.29	0.25	0	0.50	0.90	0.25	0	2.18

(a): N = number of environmental fields; HM = Herbaceous margin; IC = In crop margin; MM = Several (mixed) margin types combined; NM = No margin; NR = Natural regenerating margin; SM = Sown or planted margin
(b): Farm size groupings for each country can be found in section 2.1.4.2 (Farm selection)
(c): November 2014 download data

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The survey worked extremely well with all partners contributing to the overall picture of pesticide usage and operator exposure across Europe.

- The data entry screen worked extremely well and accommodated data from all countries. Any changes needed to the data entry and database tables were made quickly. However, there are still potential changes that could be made to the data entry screen but the use of Aqua Data Studio and SQL mean that alterations can easily be made at table level.

- There were some misunderstandings in the instructions for the collection of data used but where other participants were made aware of issues these were rectified and agreed by all. There were a number of modifications that were made part way through the process for example the introduction of Forms 7 & 8 that helped with the collection of non-crop and operator/worker activities in some countries.

- However, regular checks on the quality of the data within the database and more frequent progress discussions with all partners should have been made.

- The volume of data collected was significantly more than expected and double the volume of data collected for the pilot study. This meant that most of the budget was spent in the collection of the data leaving very little money or time available for data entry, data validation and regular meetings.

- Because of the volume of PPP data collected new priorities had to be decided which meant that some of the operator/worker data was not collected.

- The format of the survey is ideally suited to countries and spray operators who keep detailed records. Whilst we have had a huge amount of help from individual farmers and growers, asking them to collect information over and above what they were already doing (for example diaries) was not generally welcomed. Where there were only minimal records in place the use of diaries and regular phone calls did work in the collection of data.

- It is vitally important that those farmers and growers selected in the sample are fully aware of what is required in order to be able to collect data throughout the process.

- In terms of operator exposure the database is a unique source of data which can be used for evaluating annual exposure to PPP for a number of countries.

- The field margin data collected during the study is unique and could have broader applications for all regulated products that require environmental risk assessment

RECOMMENDATIONS

In some countries there were issues relating to the long term recruitment (over a twelve month period) of individual farmers. In some cases only data relating to the early part of the season were collected. This was despite the fact that the farmers were being incentivised for their participation. Data from farms with only partial information have not been recorded.

For future surveys it is essential that participants chosen for the study are those that have already participated in collaborative work. Wherever possible, farmers with existing detailed records should be chosen as this ensures the data collected are complete and will reduce the amount of their time to help with the survey. For some farms the number of contacts during the year and subsequent farm visits occupied several hours and sometimes days of their time.

Planning requires previous knowledge of the type of data recorded by each farmer. Knowing that detailed records are in place ensures that visits can be made at any time of the day and at a time most suitable for individual farmers. The use of diaries or forms for recording pesticide applications on those farms not already recording some of the pesticide applications did not work in many countries. The greatest concern was that only partial information would be recorded resulting in data that appeared to be complete which was in fact incomplete.

A change to the Nozzle section of Form 5 to include LERAP or Low Drift Star rating of nozzles would be extremely useful for future surveys.

The original specification required work related data to be collected at the same time as the pesticide usage survey. For some of the early visits this was attempted, but the sheer volume of pesticide and work related data made collecting, collating and entering the data within the allocated budget impossible. Concentrating only on the pesticide related data meant that although most countries exceeded their allocated budget the management of the data were more realistic.

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APPENDICES

Please see separate file