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FINAL REPORT OF A FACT-FINDING MISSION
CARRIED OUT IN
GERMANY
FROM 06 MARCH 2017 TO 15 MARCH 2017
IN ORDER TO
EVALUATE THE IMPLEMENTATION OF MEASURES TO ACHIEVE THE
SUSTAINABLE USE OF PESTICIDES

In response to information provided by the competent authority, any factual error noted in the draft report has been corrected; any clarification appears in the form of a footnote.

Executive Summary

This report describes the outcome of a fact-finding mission in Germany, carried out from 6 to 15 March 2017, as part of the published Directorate-General for Health and Food Safety programme for 2017.

The objective of the mission was to investigate the implementation of measures to achieve the sustainable use of pesticides, in particular the implementation of the requirements set out under Directive 2009/128/EC of the European Parliament and of the Council, and to identify the main obstacles or difficulties encountered in the implementation of this Directive, as well as good practices.

Germany's National Action Plan is the most recent manifestation of a thirty year project to reduce the risks associated with pesticides, through promoting their sustainable use to protect plants and plant products. Through a range of actions including equipment testing and training, the risks associated with pesticides had already been considerably reduced prior to the introduction of European Union legislation in this area.

The current National Action Plan sets clear targets and timelines to further reduce the risks and impacts of pesticides, and to provide growers with the tools necessary to produce high-quality, safe food. Considerable progress has been made under the current NAP, most notably, the continued reduction in the environmental risks associated with pesticides. The first formal overall review of the plan will be in 2018. The Competent Authorities have identified financial constraints limiting the effectiveness of public advisory services as an emerging risk to the sustainable use of pesticides.

The report highlights a number of good practices identified in the course of the mission, such as the publicly funded advisory services. The very high compliance rates throughout the pesticide marketing and use chain, and the successes in delivering tangible risk reduction, demonstrates that the overall German approach to the sustainable use of pesticides has achieved significant reduction in the risks associated with these products. Nevertheless, in the absence of effective and economically viable alternative controls to combat harmful organisms, the production of field crops in Germany continues to depend on pesticides.

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ABBREVIATIONS AND DEFINITIONS USED IN THIS REPORT

Abbreviation	Explanation
BLE	Federal Office for Agriculture and Food
BMEL	Federal Ministry of Food and Agriculture
BVL	Federal Office of Consumer Protection and Food Safety
CA(s)	Competent Authority(ies)
EU	European Union
ha	Hectare(s)
IPM	Integrated Pest Management
JKI	Federal Research Centre for Cultivated Plants Julius Kühn-Institute
MRL	Maximum Residue Level
MS(s)	Member State(s)
MWVLW	Ministry for Economic Affairs, Transport, Agriculture and Winegrowing of Rhineland Palatinate
NAP(s)	National Action Plan(s)
PAE	Pesticide Application Equipment
PIX	German Plant Protection Index
PPP	Plant protection product
SUD	Sustainable Use Directive
SYNOPS	<i>Synoptisches Bewertungsmodell für Pflanzenschutzmittel</i> (Synoptic evaluation model for PPPs)
UAA	Utilisable Agricultural Area
ZEPP	<i>Zentralstelle der Länder für EDV-Gestützte Entscheidungshilfen und Programme im Pflanzenschutz</i> (Central Institute for Decision Support Systems in Crop Protection)

1. INTRODUCTION

The mission formed part of the Directorate-General for Health and Food Safety planned programme for 2017. The mission took place from 6 to 15 March 2017. The mission team comprised two staff members from DG Health and Food Safety and one expert from a European Union (EU) Member State (MS).

This fact-finding mission was carried out in agreement with the Competent Authority (CA).

An opening meeting was held with the Federal Ministry of Food and Agriculture (BMEL), the Federal Office for Consumer Protection and Food Safety (BVL), the Federal Office for Agriculture and Food (BLE), the Federal Research Centre for Cultivated Plants Julius Kühn Institute (JKI), the Ministry for Economic Affairs, Transport, Agriculture and Winegrowing (MWVLW) of Rhineland Palatinate and the Ministry of Food, Agriculture and Consumer Protection of Lower Saxony. At this meeting, the mission team confirmed the objectives of, and itinerary for, the mission.

2. OBJECTIVES AND SCOPE

The objectives of the mission were to:

1. Investigate the implementation of measures to achieve the sustainable use of pesticides, as set out under Directive 2009/128/EC of the European Parliament and of the Council, hereinafter referred to as the Sustainable Use Directive (SUD).
2. Identify the main obstacles or difficulties encountered, as well as good practices with regard to the implementation of the SUD.

Article 2 of the SUD states that it shall apply to pesticides that are defined as plant protection products (PPPs) under Regulation (EC) No 1107/2009 and in keeping with this approach, all references to pesticides in this report also refer to PPPs.

In pursuit of these objectives, meetings were held with BMEL, BLE, BVL and JKI at Federal level and MWVLW, the Ministry of Food, Agriculture and Consumer Protection and the Ministry for Environment, Energy and Climate Protection of Lower Saxony at Länder level. In addition, the mission team met representatives of the agri-food industry and visited a retailer of pesticides and a demonstration farm.

The scope of the mission included relevant national legislation, the designation of relevant CAs, and the communication and co-operation within and between these CAs. The mission focused on Articles 4 to 15 of the SUD.

3. LEGAL REQUIREMENTS AND CONTEXT

This fact-finding mission was carried out in agreement with the CAs. Relevant legislation and applicable standards are listed in Annex I.

4. BACKGROUND

4.1. LEGAL CONTEXT

The SUD establishes a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of integrated pest management (IPM) and of alternative approaches or techniques such as non-chemical alternatives to pesticides.

Article 4 of the SUD requires MS to adopt National Action Plans (NAPs) to set up quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use and to encourage the development and introduction of IPM and of alternative approaches or techniques in order to reduce dependency on the use of pesticides. In addition, the NAPs shall also include indicators to monitor the use of pesticides containing active substances of particular concern, especially if alternatives are available. In their NAPs, MS shall describe how they will implement measures pursuant to Articles 5 to 15 of the SUD. NAPs shall be reviewed at least every five years and any substantial changes shall be reported to the Commission without undue delay.

4.2. PREVIOUS AUDIT SERIES

This was the first of six fact-finding missions planned for 2017 in MS to investigate the implementation of measures to achieve the sustainable use of pesticides under the SUD.

During 2012–2014 and 2015–2016, two audit series covering official controls on the marketing and use of pesticides were undertaken, during which 19 and 11 MS were audited, respectively. In both series, some aspects of the SUD were examined. In relation to the SUD, the overview report of the 2012–2014 series concluded that *"Initial measures were adequately put into place for the implementation of Directive 2009/128/EC, in particular, training and certification of professional users, safe handling and storage of PPPs, their containers and remnants, IPM and application equipment. This is a step forward to ensure the sustainable use of pesticides."* (See overview report DG(SANTE)/2015-7567) http://ec.europa.eu/food/audits-analysis/overview_reports/details.cfm?rep_id=79. The overview report of the 2015–2016 audit series was being prepared for publication.

4.3. COUNTRY PROFILE AND STATISTICS

DG Health and Food Safety has published a country profile for Germany, which can be found at http://ec.europa.eu/food/audits-analysis/country_profiles/details.cfm?co_id=DE and which summarises the control systems for food and feed, animal health and welfare, and plant health, and gives an overview on the implementation of actions to address recommendations in audit reports.

Total Utilisable Agricultural Area (UAA) in Germany is 16.7 million hectares (ha), of which just over one million ha is dedicated to organic production. The UAA comprises 70 % arable crops and 28 % permanent grassland. Vines comprise 0.6 %, and fruit growing 0.4 %, of the UAA. Germany is the EU's fourth largest user of pesticides, with 34 000 tonnes of pesticide active substances used annually, accounting for approximately 12 % of EU use. Herbicides comprise half of all pesticides used, fungicides one third, with other product types making up

the balance. The number of active substances in authorised pesticides has remained constant at between 260 and 270 over the last eight years.

In 2016, Germany produced almost 16 % of the EU's cereals, with wheat and barley being the main crops. Germany is the EU's largest producer of both oil seed rape and potatoes, with 1.4 million ha and 235 000 ha dedicated to these crops, and the EU's second largest producer of sugar beet, with 23 % of the total production, grown on 335 000 ha. Germany grows a wide range of high-value crops, often on small areas, which are of great economic and cultural importance in specific regions. In the case of hops, a critical ingredient for the brewing industry, Germany is the largest producer in the world, with 33 % of global, and 60 % of EU, hop production. 18 000 ha are dedicated to this high-value crop and 34 000 tonnes, with an approximate value of 140 million €, is produced annually, and exported to 120 countries.

Germany has 280 000 farms, and farms are large by EU standards, with an average farm size of almost 60 ha. There are huge variations between Länder in terms of farm sizes and crops grown. In the region of Rhineland Palatinate, farm sizes are small by German standards at 40 ha, and while 27 % of the UAA is devoted to arable crops, the most economically important crops are vines, fruit and vegetables. In contrast, in Lower Saxony, the average farm size is 68 ha, with 72 % of the UAA devoted to arable farming. The most important crops are maize, winter wheat, rye, winter barley, oil seed rape, triticale and sugar beet.

5. FINDINGS AND CONCLUSIONS

5.1. RELEVANT NATIONAL LEGISLATION

Legal Requirements

Article 291 of the Treaty of the Functioning of the EU

Article 23 of Directive 2009/128/EC on transposition

Findings

1. The CAs confirmed to the mission team that Germany transposed the SUD into national law via the Plant Protection Act of 6 February 2012. In addition, there are a number of ordinances under this Act, dealing with the relevant technical standards e.g. in the area of operator training and testing of pesticide application equipment (PAE). All national legislation is published in the Federal Gazette.

5.2. COMPETENT AUTHORITIES

Legal Requirements

Articles 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 of Directive 2009/128/EC

Findings

2. The CAs involved in the implementation of the SUD are designated and their roles clearly defined. The BMEL is responsible in the Federal Government Ministry responsible for phyto-sanitary issues, including the SUD. The BLE is responsible for maintaining and updating the NAP website www.nap-pflanzenschutz.de, organising the NAP Forum and updating the German Plant Protection Index (PIX), which is used to show progress

towards achieving the NAPs goals. BMEL has established a Forum on the NAP for the Sustainable Use of Pesticides to co-ordinate the activities of stakeholders in this area. There is an annual meeting of this Forum to review progress under the NAP. Membership includes the relevant Federal Ministries and Federal Higher Authorities, Federal Research Institutes, Länder, grower associations and other relevant organisations.

- The BVL is an independent higher federal authority under the jurisdiction of BMEL, and is responsible for the authorisation of pesticides, including determining appropriate risk mitigation measures, to ensure that pesticides can be used sustainably.
 - The JKI, an autonomous higher federal authority falling under the BMEL, is responsible for providing scientific support to aid the implementation of the NAP, which includes data collection on the use of pesticides, determining which indicators to use to measure progress under the NAP and determining the “necessary minimum” to apply in line with IPM, as described in paragraph 55. The JKI also supports the development of IPM guidelines, is responsible for technical issues linked to demonstration farms and hosts technical discussions and workshops.
3. The Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety is the CA for surface and ground water, while the Federal Ministry of Health is the CA for drinking water.
 4. The Länder authorities responsible for crop production are responsible for training and certification of operators' professional knowledge, dealing with requests for derogations, pest monitoring and advisory systems. In the case of the Länder visited, these tasks fall to the MWVLW of Rhineland Palatinate, and the Ministry of Food, Agriculture and Consumer Protection of Lower Saxony. Environmental Ministries at Länder level are responsible for monitoring water quality.

5.3. NATIONAL ACTION PLAN

Legal Requirements

Article 4 of Directive 2009/128/EC on National Action Plans

Findings

5. Germany has worked to promote sustainable use of pesticides for over thirty years through a range of measures such as training of operators and testing of PAE. BMEL stated that this has delivered significant quantifiable gains, such as the reduction in environmental risks associated with pesticide use by over 50 % during the 1987–2007 period. Germany first established a formal Pesticide Reduction Programme in 2004. Under this programme, a NAP drawn up by BMEL, and co-ordinated with the Agriculture Ministers of the Länder was formally adopted in 2008, and ran until 2013. Its objectives were to minimise the risks associated with pesticide use, promote innovation and the advancement of integrated plant protection in agriculture and horticulture. The main quantitative goal of the NAP was to reduce the overall risks associated with pesticide use by 25 % compared to the 1996-2005 reference period. Some other components of this NAP were:
 - That the use of chemical pesticides be kept to the “necessary minimum”, to be determined based on data from a network of reference farms.
 - Research and promotion of innovation towards integrated plant protection.
 - Improved knowledge and information.

6. The review of this first NAP by BMEL included the following conclusions;
 - The network of reference farms was useful to determine the “necessary minimum”, and to provide advice and training for both farmers and advisors.
 - The speed of integration of research into practice was disappointing, with insufficient advisory resources identified as the root cause.
 - While the range of authorised non-chemical pesticides had increased, the use of these products was very heterogeneous with regard to specific crops and sectors. More farmer orientated research, strengthened advisory services and financial or other incentives for the use of these pesticides were identified as tools to increase their use.
 - Computer-based forecasting and decision support systems can lead to more targeted treatment, thus optimising the efficiency of pesticide use, and therefore helping to reduce the volumes of pesticides used.
 - The adoption of more resistant varieties by growers, which could help to reduce dependence on pesticides, is inhibited in some sectors (e.g. fruit-growing) due to consumer preferences.
 - Additional measures are needed to promote the voluntary use of crop-specific or sector-specific IPM guidelines in practice, with EU agri-environmental schemes identified as having potential to play an important role in this area.
7. Germany adopted its second, and current, five-year NAP in May 2013, drawing on the experiences gained from the first NAP. It was drawn up by BMEL, with the collaboration of the Länder and the participation of groups of relevant stakeholders. It encompasses pesticide use in agricultural, forestry and horticultural areas, non-agricultural uses (municipal applications, sports grounds, parks), in home gardens and in allotments. The NAP, and the overall German approach to sustainable use of pesticides, is based on the premise that plant protection is necessary to protect plants against diseases and pests, in order to protect both yield and quality. The NAP adds that in this way, plant protection benefits society by protecting employment in rural areas and enhancing resource use efficiency in crop production. Building on this foundation, the NAP focuses on reducing the risks associated with the use of pesticides, rather than the volumes used. The NAP states that this is because simply quantifying the volumes of pesticides used overlooks the benefits and characteristics of the specific individual substances involved, and the risks associated with their use.
8. The NAP is drawn up having considered international guidance, other relevant EU legislation and national policies. These include;
 - Food and Agriculture Organisation of the United Nations and the Organisation for Economic Co-operation and Development (OECD) recommendations on risk-reduction in the use of pesticides,
 - Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora,
 - Directive 2000/60/EC establishing a framework for Community action in the field of water policy, and,
 - National policies such as the National Biodiversity Strategy, the National Sustainability Strategy and the National Research Strategy Bio-Economy 2030.
9. The high level targets of the NAP are:
 - A 30 % reduction in the environmental risks associated with pesticide use by 2023, compared to the 1996–2005 period;

- The incidence of Maximum Residue Level (MRL) breaches to decrease below 1 % by 2021, for all food groups of domestic, EU and non-EU origin;
 - A further reduction in the adverse impacts of chemical pesticide use for operators, workers, bystanders and residents;
 - To reduce the risks and impacts associated with pesticide use on human health and the environment;
 - To introduce and develop plant protection practices with low pesticide input;
 - To keep the use of pesticides to levels that are necessary;
 - To improve safety in the handling of pesticides;
 - To improve balanced information for the public relating to the benefits and risks of plant protection, including the use of chemical pesticides.
10. The reduction in environmental risk has been achieved, or is on target to be achieved, as described in paragraphs 38 and 59. Similarly, the targets for MRL compliance are on target to be achieved for EU-produced food. The results of Germany's MRL monitoring programme in 2015 show that 98.9 % of food produced in Germany, 99.5 % of food produced in other EU MS and 96.5 % of food produced in non-EU countries complied with the relevant MRLs.
11. In addition, there are a range of sector and topic specific targets, each of which will be dealt with under the relevant chapter of this report. The Länder are responsible for undertaking many of the actions identified in the NAP. However, there are no targets established for individual Länder, leading to the risk that some Länder may not commit the necessary resources to the delivery of the NAP targets in their area.
12. BLE, in conjunction with JKI, BVL, the Federal Institute for Risk Assessment, the Federal Environment Agency and the Länder, will draw up a report on the implementation of the NAP by mid-2017 in relation to the 2013-2016 period. This report will provide a basis for a formal review and amendment, if necessary, of the NAP within a five year period as required by Article 4 of the SUD. The NAP, and a range of associated information, including the annual report of the Forum is available at www.nap-pflanzenschutz.de.
13. According to the Germany CAs, a critical part of the sustainable use of pesticides is ensuring that only pesticides authorised, or granted parallel trade permits, are marketed and sold. Consequently, in 2008, BMEL established a Working Group to deal with the trade in, and use of, illegal pesticides. This group comprises representatives of both Federal and Länder authorities, and associations representing distributors and farmers, and has tried to develop a co-ordinated Germany wide approach to this issue. In particular, Hamburg was the first EU port to identify the risks associated with the importation of illegal pesticides into the EU, and subsequently established risk-based control systems in this area. In addition, the Hamburg authorities have provided, and continue to provide, valuable technical assistance to other MS in developing similar systems. BVL stated that other German ports, and airports, are now considering implementing similar risk-based controls.

14. A number of German authorities have participated in both Operations Silver Axe I and II, which are Europol organised operations targeting the importation of illegal pesticides into the EU. The CAs stated that Germany authorities conduct controls on pesticides intended for use in either other MS or non-EU countries under Article 28 (2)(c) and (d) of Regulation (EC) No 1107/2009. DG Health and Food Safety audits have identified the absence of controls in this area as a critical weakness in the battle against the trade in, and use of, illegal pesticides. BVL added that co-operation between MS in controls on the marketing of pesticides is critical as there is evidence that illegal operators seek to import product through ports and land borders where controls are weakest.



Picture 1. Hamburg authorities have recognised the risks associated with pesticide imports and have established controls in this area.

Conclusions

15. Germany has a track record of promoting the sustainable use of pesticides and reducing the risks associated with their use. The current NAP continues this work, and establishes clear national targets and timelines in many key areas, focusing on reducing the risks associated with pesticides.
16. In many cases in the NAP, it is not clearly stated what actions are required, and by what authority, in order to achieve its goals, both of which increase the risk of the goals not being achieved.

5.4. TRAINING AND CERTIFICATION OF OPERATORS

Legal Requirements

Article 5 of Directive 2009/128/EC on training and certification

Article 6 of Directive 2009/128/EC on pesticide sales

Findings

17. Under Article 9 of the Plant Protection Act, all retailers of pesticides, including micro-distributors and internet sales operators, advisors and professional users of pesticides

must, by 26 November 2015, possess a certificate proving appropriate professional knowledge.

18. Germany has established a comprehensive system for the training and certification of all operators involved in the distribution and use of pesticides authorised for professional use, in line with EU requirements. Initial training is generally provided by the Länder, and takes 3-4 days, and usually includes an examination. Follow up training is provided by the Länder or approved bodies, in line with a nationally agreed guideline, following an examination of the qualification of the trainers, the course content and the duration of the training course. Initial training covers all aspects under Annex I of the SUD, whereas additional training covers only some aspects, but IPM and phyto-sanitary legislation is always included. Industry-organised workshops and demonstration farm open days are not officially recognised as counting towards meeting training requirements. Initial training must be undertaken, and an examination passed, in order to be certified. Certificates are valid indefinitely, provided operators undertake on-going additional training. In the case of retailers, all staff involved in selling pesticides must be trained. Advisors are not legally required to have university training in agronomy, but in practice, virtually all advisors have a relevant university degree.
19. Technical training is a pre-requisite for all farmers and landscapers/park wardens, winegrowers and foresters in Germany, which the CAs believe provide a sound, scientific knowledge for their future careers in food production and landscape management. They added that nowadays most young farmers undertake additional education, with many studying agriculture to university degree level.
20. Under Article 23 of the Plant Protection Act, from 26 November 2015, professional use pesticides may be sold only to professional users who possess a certificate. It also requires retailers to inform non-professional users of the risks of pesticide use, and to provide guidance on storage, handling, application and safe disposal of pesticides. The sale of pesticides through automatic vending machines or via self-service has been prohibited in Germany for thirty years. These measures ensure that all users of pesticides, including amateur users, receive guidance on the use of pesticides at the time of sale. Since 2016, Länder controls at retailers include a check that professional use pesticides are only sold to trained professional users holding a certificate. While BVL have not yet compiled this data for 2016, both Länder visited reported compliance levels of virtually 100 % in this area.
21. The CAs estimate that there are approximately 12 000 distributors/retailers of pesticides and 300 000 professional users in the country. Each year about 5 500 sales staff working at pesticide retailers and 4 500 professional users are controlled during routine inspections at their premises to verify that they are trained and possess a relevant certificate, with compliance levels of 98-99 % consistently found in both cases.

5.5. INFORMATION AND AWARENESS-RAISING

Legal Requirements

Article 7 of Directive 2009/128/EC on information and awareness-raising

Article 10 of Directive 2009/128/EC on information to the public

Findings

22. The NAP website, www.nap-pflanzenschutz.de, is the primary information platform, operated by the BLE, relating to SUD in Germany. The website also provides links to a range of other relevant websites offered by the Federal Government, federal authorities, federal states or associations. These websites are targeted at different stakeholder types e.g. distributors, farmers and the general public. Restrictions on the sale of pesticides as described in paragraph 20 ensure that users of pesticides get sufficient information about safe use at the time of sale. The CAs stated that some Länder provide specific training on IPM and the safe use of pesticides for non-professional users. Due to the nature of awareness raising and the multi-faceted target group, there are no defined targets and timelines specified in the NAP, and consequently no indicators proposed to measure progress in this area.
23. Information on both acute and chronic poisoning cases linked to pesticides is recorded at Länder level. The CAs stated that in 2013, 2014 and 2015, 50, 52 and 73 acute poisoning cases linked to pesticides were reported, with a single case of chronic poisoning reported in the three years. The CAs were unable to provide greater detail in this area, and expressed their concerns regarding the accuracy of this data. In order to address this concern, the Federal Institute for Risk Assessment is developing a national poisoning reporting system, which is expected to be operational from 2019, so as to have more detailed data in this area in future.

5.6. PESTICIDE APPLICATION EQUIPMENT

Legal Requirements

Article 8 of Directive 2009/128/EC on inspection of equipment in use

Findings

24. Testing and certification of field sprayers has been obligatory in Germany since 1993 and for vertical crop sprayers since 2002. Vertical crop sprayers are used in vertical crops such as orchards and vines. In fact, prior to the SUD, Germany's requirements were more onerous, requiring tests on equipment every two years, rather than every five years up to 2020 and every three years thereafter as required under the SUD. Historically, Germany also required new equipment to be tested and certified prior to first sale, but this is now a voluntary, rather than a compulsory, requirement. Consequently, the NAP provides little detail in this area, leaving Article 16 of the Plant Protection Act to define the targets and timelines in this area.
25. Germany has established a comprehensive system of testing, and certification of PAE, in line with, and in some cases going beyond, EU requirements. Currently Germany requires that all boom sprayers (including those < 3 metres), vertical crop sprayers, aerial spraying equipment, spray trains, smoking/fogging equipment and glasshouse sprayers are tested, and certified, every three years. Furthermore, all granule applicators (e.g. slug pellet applicators), seed treatment equipment and soil disinfection equipment will be required to be tested, and certified, before 1 January 2021, and every three years thereafter. Germany does not require testing of hand held equipment e.g. knapsack sprayers. The CAs stated

that all tests are in line with the requirements of Annex II of the SUD and the relevant European standard, where relevant.

26. The CAs for the testing and certification of PAE are the Plant Protection Services of the Länder, who certify, train and supervise the PAE testing operators. The CAs estimate that 217 000 pieces of equipment currently fall under the testing regime, comprising 126 000 boom sprayers, 42 000 vertical crop sprayers, 45 000 glasshouse sprayers, 4 000 foggers and 30 spray trains. The CAs estimate that 100 % of boom sprayers and 75 % of vertical crop sprayers have been tested as required. Testing of glasshouse sprayers, foggers and spray trains only became compulsory from 30 June 2016, and the CAs estimate that, to date, just one third of spray trains and < 5 % of glasshouse sprayers and foggers have been tested. The CAs added that many larger farms, and producers certified under voluntary Quality Assurance schemes, have their equipment tested annually. PAE tested and certified in other MS is mutually recognised in Germany.
27. Germany has gone beyond the requirements of the SUD in establishing a target, and a timeline, for the use of drift reducing nozzles/equipment. The target is that at least 50 % of boom and vertical crop sprayers have nozzles capable of reducing spray drift by at least 75 % by 2023. While there is no hard data available on this point, the CAs believe that pesticide users have adopted this technology and the targets have already been achieved.

5.7. AERIAL SPRAYING

Legal Requirements

Article 9 of Directive 2009/128/EC on aerial spraying

Findings

28. Aerial spraying was widely practiced in Germany up to the 1970s, particularly on larger farms in the former East Germany. Germany has regulated the aerial application of pesticides for thirty years, and the areas treated have declined over that time. The aerial application of pesticides has been prohibited since 2012 under the Plant Protection Act, but derogations are possible where there are no viable alternatives. Aerial spraying under derogation is confined to just a few Länder, with Rhineland Palatinate being the most relevant. Approximately 2 500 ha of steep-slope vineyards are treated annually to control fungal diseases in Rhineland Palatinate. The area of forestry treated is more variable between years, but in 2015, the most recent year for which data is available, 1 500 ha was treated to control pests in various Länder.
29. The Länder have developed national criteria for granting aerial spraying permits. In the case of vineyards, the slope must be greater than 30 per-cent, at which point the use of other equipment poses health and safety risks, and environmental risks in cases of accidents. Permits are granted for aerial application in forestry based on an independent assessment that if no actions are taken, the trees will be killed by the pest. In all cases where permits are granted, relating to both vineyards and forestry, there are a range of conditions in line with Article 9 of the SUD, so as to ensure safe use of the pesticide and the CAs conduct intensive controls to verify that the conditions of the permits are adhered to.

30. The MWVLW of Rhineland Palatinate explained that vine production on terraces on the steep slopes along the Upper Middle Rhine valley is integral to its classification by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) as a World heritage site <http://whc.unesco.org/en/list/1066>. This unique landscape is home to rare species of plants and animals. They added that no other crops can be grown on these slopes, that aerial application is the only safe method to apply pesticides without which vine growing would not be feasible, and that failure to grant these permits would result in land abandonment and the loss of these unique landscape features, threatening the future of the flora and fauna of the region.



Picture 2. Steep slope vineyards.

5.8. WATER PROTECTION

Legal Requirements

Article 11 of Directive 2009/128/EC on specific measures to protect the aquatic environment and drinking water, and relevant provisions of Directive 2000/60/EC

Findings

31. In Germany, 75 % of drinking water is derived from ground water and 25 % from surface water, with wide regional variations. The NAP sets very clear, time-bound targets in the area of water protection. These include targets for both actions and outcomes. The action targets include;
- Creation of permanent vegetation buffer zones, at least 5 metres wide, alongside 80 % of surface waters in protected areas for drinking water, nature reserves and in sensitive areas identified by hot-spot analyses by 2018, and alongside 100 % of such waters by 2023.
 - Creation of buffer zones comprising permanent vegetation or agricultural use without the use of pesticides under EU agri-environmental measures alongside 100 % of the surface waters in the agricultural landscape, with no defined timeline.

32. In addition to these action targets, restrictions under Article 12 of the Plant Protection Act are a critical component in reducing the aquatic risk linked to pesticide use. Article 12(2) prohibits the use of all pesticides on areas not devoted to agriculture, horticulture or forestry, except under a specific permit. Therefore, pesticide use on hard surfaces such as roads, footpaths and very permeable surfaces such as railways, is prohibited except under a permit. Permits are granted by the Länder authorities, in line with criteria agreed at a national level. Permits are only granted where there are no viable alternative control methods and the need to control the pest has been shown e.g. controlling weeds on railways for safety reasons. In both 2014 and 2015, approximately 2 500 permits for the use of pesticides were granted nationally under Article 12(2). These mainly applied to pesticide use on roads, railways and to combat invasive weed species.
33. The NAP indicates that by 2014, the BVL, JKI, the Federal Institute for Risk Assessment and the Federal Environment Agency would jointly determine criteria for identifying active substances of particular concern, substances hazardous for the aquatic environment and priority hazardous substances. It adds that following this, they would determine quotas specific to active substances and dates for reduction of the use of pesticides containing these active substances. BVL stated that the criteria had been defined and they expect the specific substances to be determined by mid-2017, following which quotas will be established with a view to reducing the use of pesticides containing these active substances.
34. Historically, samples from the largest 400 of the 6 000 water bodies in Germany were analysed to measure water quality. The NAP identified the need to determine the water quality status in smaller water bodies by 2018. This project was initiated in 2014, and is on target to meet the 2018 timeline.
35. In terms of progress towards achieving the action targets, there is no agreed definition of sensitive areas at a national level, but work is on-going to agree a national definition. The CAs believe that there has been progress made in developing buffer zones in sensitive areas, but at this point there is no hard data to quantify progress at national level.
36. The outcome targets of the NAP include;
- Full compliance by 2015 with Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 98/83/EC on Drinking Water, Directive 2006/118/EC on Ground water and Directive 2008/105/EC on Environmental Quality Standards in surface water. In summary, that is that all pesticides, and their metabolites, to be below 0.1 µg/l for a single active substance and 0.5 µg/l for the sum of all active substances in all ground and surface waters used for drinking water supplies by 2015 and no exceedances of the Environmental Quality Standards for priority active substances and relevant metabolites in surface waters.
 - Full compliance with the health-related orientation value for non-relevant metabolites found in water by 2018. This is an additional Germany-specific standard going beyond the EU legal requirements. The Federal Environment Agency has recommended that for non-relevant metabolites of pesticides, the health-related orientation value be set at 1.0 µg/l for individual substances and 3.0 µg/l as a combined figure for all non-relevant metabolites detected.
 - A 20 % reduction in the environmental risks associated with pesticide use by 2018, and a 30 % reduction in risk by 2023, compared to the 1996–2005 period, measured using SYNOPS (Synoptic evaluation model for pesticides).

37. Germany undertakes an extensive suite of monitoring for pesticides;

- In 2014 and 2015, 170 000 and 200 000 samples of drinking water were analysed for pesticides, with levels of pesticides exceeding the legal threshold of 0.1 µg/l found in just 0.01 to 0.04 % of samples.
- The most recent comprehensive national data on ground water dates from 2009-2012, and showed that the threshold of 0.1 µg/l was exceeded in 4.6 % of ground water monitoring stations.
- Almost 90 % of pesticide detections in ground water related to active substances that were no longer approved in the EU. *Bentazone* and *mecoprop-p* were the most frequently found active substances in authorised pesticides present at > 0.1 µg/l. The CAs stated that pesticides containing these active substances are particularly susceptible to leaching.
- The CAs stated that there was no recent national data for surface water, as there is no system to collect this data annually and the CAs had no data on compliance with the health-related orientation value for non-relevant metabolites.
- In cases where active substances exceeding 0.1 µg/l are found in ground water, there is an investigation to determine the root cause. In response to these findings, BVL have restricted the conditions of authorisations for relevant pesticides, for example linked to soil type and the season of use.

38. SYNOPS is a computer-based model used to measure relative changes in pesticide-related risks to aquatic and terrestrial ecosystems based on pesticide sales. It is calculated based on the volumes of pesticide active substances sold, the characteristics of these substances and assuming realistic worst case scenarios for the environmental conditions. The acute and chronic risks to aquatic organisms associated with pesticide use, measured using SYNOPS, has been reduced by 39 % and 49 % respectively compared to the 1996-2005 baseline, compared to the target reduction in the NAP of 30 % by 2023.

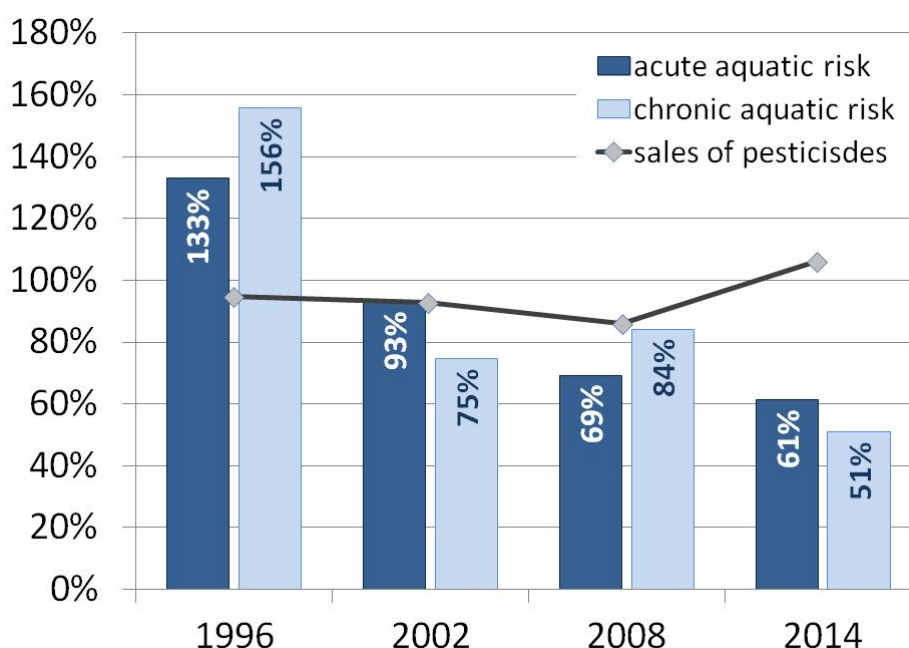


Figure 1. Trend in risk to aquatic organisms linked to pesticides from 1996 to present, provided by JKI. The baseline value of 100 % is the average of the 1996-2005 period.

Conclusions

- 39. Monitoring data shows high levels of compliance with drinking water quality standards.
- 40. The risk to aquatic organisms associated with pesticide use has significantly reduced in recent years, comfortably achieving the targets established under the NAP.

5.9. PESTICIDE USE IN SPECIFIC AREAS

Legal Requirements

Article 12 of Directive 2009/128/EC on the reduction of pesticide use or risks in specific areas

Findings

- 41. Germany has established a system to ensure safe use of pesticides in public areas in line with the SUD. In addition to the restrictions under Article 12(2) of the Plant Protection Act described in paragraph 32, under Article 17 of the same Act, only pesticides which have been authorised by the BVL for use in public areas, or which are authorised as low-risk pesticides under Article 47 of Regulation (EC) No 1107/2009 may be used in areas designated for the public such as flowerbeds and lawns in public parks, sports grounds, school grounds and in proximity to health care facilities, except under a specific permit. Therefore, to use a pesticide on flowers in a public park, a permit under Article 17 is required, whereas to use a pesticide on a footpath in a public park, a permit under both Article 12(2) and Article 17 is required. Permits are only granted where there are no viable alternative control methods and a critical need has been established. The permit under Article 17 establishes whether, and for how long, the public must be informed during or after the use of pesticides, for example, by means of barriers and warning signs. Germany has prohibited the use of pesticides containing glyphosate in national parks, natural monuments and nature reserves since 2003.
- 42. Given the restrictions outlined above, it is understandable that the NAP has few quantitative targets and timelines in this area, but aims for a continued reduction in the risks associated with the use of pesticides in these areas. In addition, it is worth noting that a number of actions proposed in other areas are also relevant in this area, such as extending the range of practicable non-chemical tools for plant protection and the development of IPM guidelines for maintaining non-agricultural land.

5.10. HANDLING AND STORAGE OF PESTICIDES

Legal Requirements

Article 13 of Directive 2009/128/EC on handling and storage of pesticides and treatment of their packaging and remnants

Findings

- 43. The NAP states that the handling, storage and transport of pesticides is covered by a range of national legislation, and therefore the NAP defines few targets and timelines in

this area. All operators in the pesticide distribution and use chain must be knowledgeable on the handling and storage of pesticides, and this is covered in the compulsory training. One clear target is that 80 % of PAE with tank sizes of 200 litres or more should be fitted with fresh-water tanks by 2018, and 100 % by 2023, so as to enable washing down of the PAE in the field. While both CAs and growers believe there has been progress in this area, there is no hard data to measure progress at national level.

44. Storage conditions for pesticides are controlled by routine controls at all types of operators, except manufacturers. In both 2014 and 2015, storage conditions were controlled at about 2 500 professional users, with compliance levels of 95 % found in both years. In the case of retailers, storage conditions are controlled as part of routine inspections at over 1 000 operators annually, with compliance levels of 98-99 %.
45. The CAs outlined that the pesticide industry has established a voluntary, self-funding system for the disposal of empty pesticide packaging (www.pamira.de) for over 20 years. All packaging accepted under this scheme must be triple rinsed. There is no charge for the scheme and it is estimated that 75 % of all pesticide packaging is disposed of through this scheme. At distribution level, revoked pesticides may be stored indefinitely, provided they are clearly segregated and labelled, and the active substance remains approved at EU level. Pesticides revoked for more than 18 months cannot be stored at user level and must be destroyed as hazardous waste. There are no overall national data on the disposal of old pesticides as hazardous waste. Public recycling centres accept limited quantities of old pesticides for destruction as hazardous waste, while some retailers facilitate growers by taking in old pesticides, combining these relatively small quantities from many growers into larger batches, and then getting this material destroyed as hazardous waste, thus significantly lowering the cost for the individual grower.

Conclusions

46. There are effective measures to ensure the safe handling and storage of pesticides, based on training and enforcement.
47. There are facilities in place for the safe disposal of empty packaging, and the majority of this material is disposed of in a manner so as to reduce environmental risk.

5.11. INTEGRATED PEST MANAGEMENT

Legal Requirements

Article 14 of Directive 2009/128/EC on IPM and Article 55 of Regulation (EC) No 1107/2009.

Findings

5.11.1. Background

48. Germany has approached the promotion of IPM in a multifaceted manner. Firstly, biodiversity, IPM and the sustainable use of pesticides is addressed at a Federal level through a range of strategic initiatives, such as the National Biodiversity Strategy, which plans to reverse the decline of relevant birds and animals by 2020 and the Federal Programme for Organic Farming and other forms of Sustainable Agriculture (BÖLN),

which aims to promote organic farming and greater use of IPM techniques in conventional farming. These strategic initiatives are complementary to measures taken under the NAP.

49. Furthermore, initiatives to promote IPM did not just start with the implementation of the SUD. Germany formally established basic guidelines on good plant protection practice in 2005, which included the principles of integrated plant protection. Currently, Article 3 of the Plant Protection Act requires all professional users of pesticides to comply with the general principles of integrated plant protection in accordance with Annex III of the SUD. It is worth noting that the NAP consistently uses the term integrated plant protection, which is defined in the German law on plant protection, rather than integrated pest management.
50. The CAs emphasised that the overall German approach to IPM is based around training and promotion, with the aim of getting growers and their advisors thinking about IPM, rather than restrictions and regulations, such as pesticide taxes, in order to drive change in grower practices. The NAP states that it is foreseen that integrated plant protection and an increase in organic farming will lead to a reduction in the use of pesticides due to the increased use of preventive, non-chemical pesticides and also the continued reduction in the use of chemical pesticides in order to comply with the necessary minimum. The NAP does not describe how IPM will be monitored at the individual grower level. At an overall national level, the NAP uses compliance with the necessary minimum, the proportion of UAA under organic agriculture and the proportion of operators farming according to crop or sector-specific guidelines on integrated plant protection as indicators to monitor the implementation of the general principles of IPM by professional users.
51. The SUD defines IPM as the *“careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. ‘Integrated pest management’ emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms”*. The CAs emphasised that in their opinion, for field crops, in many cases there are no effective non-chemical tools to control economically important pests e.g. *Septoria leaf blotch* in wheat, and therefore growers are heavily dependent on pesticides for plant protection

5.11.2. IPM specific targets in the current NAP

52. The current NAP has a wide range of targets, many with associated timelines, in the area of IPM. These can be grouped into three broad categories;

Support services

- Maintaining, extending and/or strengthening the official Länder advisory service, including the use of electronic media by 2018, but no defined target is established.
- Broadening the range of authorised pesticides, particularly for minor uses and for stored products, so that for 80 % of crop/pest combinations, at least three modes of action will be available by 2023, to help sustainable resistance management strategies. The CAs stated that having at least three modes of action for each pest is in line with

the science-based guidance of the European and Mediterranean Plant Protection Organisation and the Food and Agriculture Organisation of the United Nations.

- Developing resistance management strategies for all crops by 2018.

Farmer practices

- All farmers to use no more than the “necessary minimum” quantity of pesticides in 95% of cases, for the crops grown, based on data from a network of reference farms throughout the country, on an on-going basis.
- 20 % of the agricultural and horticultural area to be under organic farming without a deadline for achievement.
- Officially recognised crop or sector specific IPM guidelines, developed by grower organisations, to be available for all crops, and non-crop areas, by 2018.
- 30 % of agricultural and horticultural farms to farm in accordance with the relevant IPM guidelines 3 years after publication, rising to 50 %, 5 years after publication.

Protection of non-target terrestrial organisms and promoting biodiversity

- Reduction of the risk potential from pesticides for non-target terrestrial organisms, using the SYNOPS risk indicator, by 20 % by 2018, and 30 %, by 2023.
- Increasing the proportion of habitats and retreat areas (e.g. hedges, fallow land, wildflower strips) in the agricultural landscape for beneficial organisms and non-target organisms, from 3 to 7 % of the area by 2018, increasing to 5 to 10 % by 2023.
- Increasing the UAA on which, within the framework of various support programs, adapted farming measures are carried out, including activities to protect the diversity of wildflowers in the peripheral field area.

5.11.3. Progress towards achieving IPM specific targets

53. The 2008 NAP highlighted the Länder advisory services as a critical part of the sustainable use of pesticides, a position strongly supported by both grower organisations met and by the pesticide industry. Growers acknowledged the excellent technical advice available from pesticide companies and retailers, but emphasised the benefits of independent research and advisory services, particularly in promoting alternative techniques to protect plants and plant products. These services are either free, or greatly subsidised, and are currently limited by financial constraints within the Länder. The structures for providing, and the financial commitment to, these services, varies between Länder. The Rhineland Palatinate structure of wholly publicly funded integrated agricultural education, research and advisory services could be considered as a good practice in terms of providing high-quality, independent information to growers. Lower Saxony provides advisory services through their Chamber of Agriculture, which is co-funded by public funds and grower levies. Despite the relevance of Länder advisory services, there is no national data available on trends in this area. Under the current NAP, an advisory index has been established. The BLE has determined the extent of the Länder advisory services in 2013 and will conduct a further analysis every three years to determine trends in this area. In Rhineland Palatinate, advisor numbers, a proxy for the service provided to growers, have declined by 50 % over the last 30 years, and the decline has continued during the period of the current NAP. In Lower Saxony, while advisor numbers had remained constant over the last 10 years, the CA added that more advisors

could help to promote alternative techniques to protect plants and plant products. Both Länder provide a vast amount of timely information on all aspects of crop production to guide growers in IPM. Traditionally this was largely based around face to face meetings with individual farmers. Nowadays, this information is provided in the form of technical manuals, newsletters, email and text alerts, with growers guided in specific problems through discussion groups and phone calls.

54. Efforts to develop resistance management strategies for all crops and to broaden the range of authorised pesticides, particularly for minor uses and for stored products, to help sustainable resistance management has had limited success. There is no established baseline and no national trends on the number of modes of action for each crop/pest. The CAs reported that Germany currently has 15 major crop/pest combinations with less than three modes of action for specific pests and 2 600 minor crop/pest combinations in a similar situation.
55. Compliance with the “necessary minimum” is determined based upon examination of spray records from a network of 146 reference farms considered to be typical growers. JKI stated that on average, 96 % of growers are compliant in this area, but there are significant crop and year variations. The “necessary minimum” is determined in co-operation with experts from the plant protection services of the Länder. It is based on pest infestation levels, pest thresholds and weather conditions. It also takes into account the use of non-chemical controls, the alternation of active substances for effective resistance management and economic efficiency. The Länder advisory services provide advice to growers, based on all these factors, and the CAs stated that by adhering to this advice, growers would be compliant with the “necessary minimum”. The CAs emphasized that the “necessary minimum” depends on a wide range of factors, including weather events, soil types and topography, and by its nature is specific to local areas. “Non-compliances” are used to focus Länder advisory services’ priorities for the following seasons, rather than as a basis for penalising growers.
56. These evaluations of the separate records from reference farms are the only measure of compliance with IPM among growers as official controls on pesticide professional users do not cover the implementation of IPM general principles. While determining compliance with the “necessary minimum” does not involve an explicit examination of each of the eight principles of IPM as described in Annex III of the SUD, many of these aspects are included in determining the necessary minimum e.g. pest thresholds, giving preference to non-chemical control methods, reduced doses and frequency of applications and alternating products with different modes of action. Almost 2.5 % of professional users of pesticides are controlled each year, under both Cross Compliance and checks under specific legislation by the Länder, with an overall compliance rate over 95 % relating to the storage and use of pesticide, indicating that pesticides are used in a safe manner in Germany.
57. Less than 7 % of the agricultural and horticultural area is currently under organic farming, some way short of the 20 % target of the NAP. There is significant variation between Länder, with 8 % of UAA in Rhineland Palatinate farmed organically, compared to 3.5 % in Lower Saxony.
58. To date, there are no officially recognised crop, or sector specific, IPM guidelines developed and recognized by grower organisations under the NAP, although work is on-

going in this area. The CAs believe that it is critical for the widespread adoption of these guidelines that they are developed by the growers.

59. The risk associated with pesticides for non-target arthropods and soil organisms, measured using SYNOPS, has been reduced by 14 and 19 % respectively, and is on track to meet the NAP target of 30 % reduction by 2023. Risk reduction targets relating to aquatic organisms have been achieved as described in paragraph 38. Figures 1 and 2 show that the risk to both aquatic and terrestrial ecosystems associated with pesticide use has been significantly reduced compared to the 1996-2005 reference period despite a marginal increase in sales, and therefore use, of pesticides. The CAs attribute this significant progress to the requirements of the EU's pesticide regulatory system under Directive 91/414/EEC and Regulation (EC) No 1107/2009, which has resulted in currently authorised pesticides having a more favourable environmental profile compared to the products of 20 years ago.

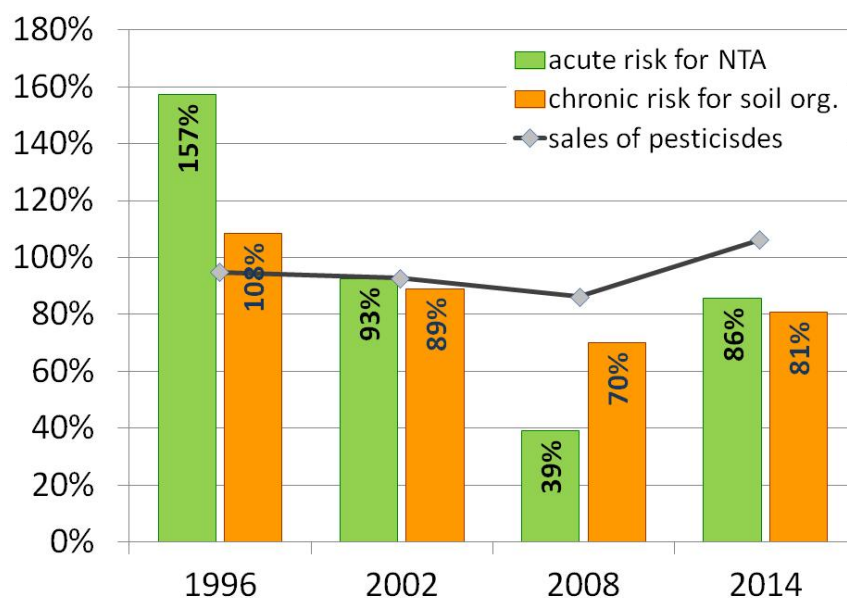


Figure 2: Trend in risk for non-target arthropods and soil organisms linked to pesticides from 1996 to present, provided by JKI. The baseline value of 100 % is the average of the 1996-2005 period.

60. There are no national data on the proportion of habitats and retreat areas in the agricultural landscape for beneficial organisms and non-target organisms.
61. Germany has made extensive use of EU Rural Development funds under Pillar II of the Common Agriculture Policy to promote the use of non-chemical techniques to protect plants and plant products that are available, but not economically viable. For example, growers can claim additional payments for IPM related measures such as using biological controls against the European corn borer in maize and pheromones in orchards to control codling moth, establishing buffer zones adjacent to water courses and including flower strips in arable fields. In Lower Saxony, growers can claim additional payments for crop rotation practices and including flower strips in arable fields. At a national level, 25 % of

UAA is implementing some measure under Rural Development programmes, many of which contain measures complementary to IPM.

5.11.4. Associated actions relevant to IPM

62. Pest monitoring, and the dissemination of the resultant information has been a cornerstone of IPM in Germany for decades. The ISIP system (Information System for Integrated Plant Production), <http://www.isip.de/isip/servlet/isip-de/infothek/uebersicht>, collates all official pest monitoring information on over 150 different pests on all major agricultural and horticultural crops. This data is then used, in conjunction with data from 600 weather stations, and scientifically based pest thresholds, to guide growers in taking appropriate plant protection measures. This includes information on variety choice, rotation, plant nutrition, as well as treatment of pests. The Länder have also, with the support of the Federal Ministry of Agriculture, established the ZEPP decision support system (Central Institute for Decision Support Systems in Crop Protection), <http://www.zepp.info/ueber-uns?id=99>. There is on-going investment in this system to improve the quality of the guidance provided and, in particular, to link the system with precision farming tools. Each Länder issues daily bulletins via email, based on ISIP and ZEPP data, informing growers on pest levels on crops in their region, and guiding their pest control choices. This service is free in some Länder, but fees apply in others. The CAs stated that virtually all growers received these bulletins, but there is no data on the extent to which the information from public advisory services guides their decision making.

63. In 2011, Germany initiated a network of demonstration farms using the pilot scheme "Demonstration project for integrated plant protection", which currently includes 52 demonstration farms (66 farms in 2015), covering the main crops throughout the country. These farms are used to demonstrate tried-and-tested and innovative procedures in IPM. The farmers receive intensive advice from the Länder advisory services, with one full time equivalent advisor per five demonstration farms. The experience to date is that only very small reductions in pesticide use was achieved by this additional advisory input, which the CAs believe reflects the extent of good practices already used by growers. There is no national target in this area and no tool to measure how demonstration farms changes practices of similar farmers in the region.

5.11.5. Barriers to implementation of IPM

64. While considerable work has been, and is being, undertaken by authorities at Federal and Länder level to promote IPM, some significant blockers remain. The CAs highlighted three broad issues, the availability of non-chemical control techniques, the growing issue of resistance and finally and the requirements of the food retailer sector.

65. The first broad issue is the range of non-chemical tools available to growers to control pests. The CAs highlighted the case of wheat, where fungal diseases, chiefly *Septoria leaf blotch* can result in significant yield losses, if not controlled. They emphasised that there are no varieties with sufficient resistance to avoid the need for fungicide treatments and their view is that there are no effective cultural controls e.g. rotation is of no benefit and there are no effective biological pesticides to combat this disease. Therefore, their view is that in the absence of effective non-chemical controls, IPM in this case involves the proper use of authorised pesticides.

66. The CAs also gave the example of oil seed rape, which is grown on 1.4 million ha. They pointed out its importance as a broad-leaf break crop, which means that it reduces the disease burden in the following cereal crop. The specific problem pests of this crop include cabbage root fly (*Delia radicum*), for which there is no authorised insecticide, cabbage stem flea beetle (*Psylliodes chrysocephala*) and black winter weevil (*Ceutorhynchus picipitarsis*), for which only pyrethroid based insecticides are authorised, but to which there is some resistance. Other relevant pests include rape stem weevil (*Ceutorhynchus napi*) and cabbage stem weevil (*Ceutorhynchus pallidactylus*) for which pyrethroid and neo-nicotinoid insecticides are authorised. The CA's view is that there are no viable non-chemical controls of these pests, such as rotation, variety choice and manipulation of the sowing date, and no effective biological controls.
67. The CAs highlighted that some economically important pests of widely grown field crops are becoming increasingly resistant to pesticides, which they attribute to the repeated use of a limited range of pesticides with the same mode of action. In the case of pollen beetle in oil seed rape, resistance to pyrethroid insecticides has increased significantly over the last ten years. There are just two other modes of action effective against this pest and the CAs stated that there are no viable cultural control techniques. They fear that an over reliance on these other pesticides will also lead to the development of resistance in these cases.

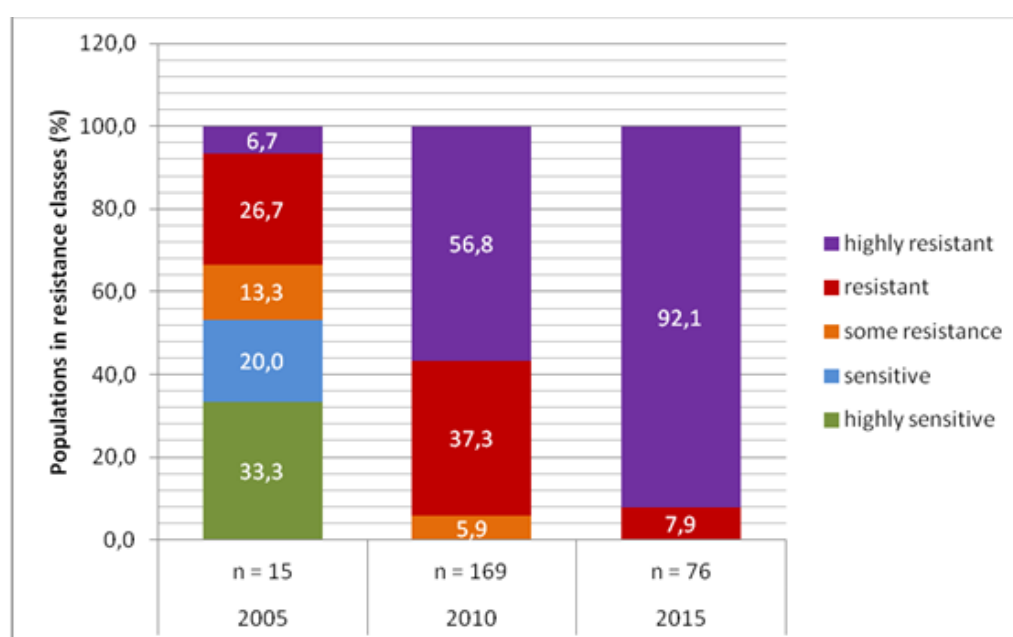


Figure 3: Trend in pollen beetle resistance to pyrethroid based pesticides in Germany.
Source: Federal Research Centre for Cultivated Plants Julius Kühn-Institute

68. Low risk pesticides have not yet been defined at an EU level, so BVL could not provide specific data in this area. Nevertheless in a broader context, biological pesticides can be considered as lower risk as these are all permitted for use in organic agriculture. Germany has made significant progress in this area, with the range of authorised pesticides containing biological active substances having almost doubled from 11 to 20 over the last ten years.
69. Germany defines minor crops as those grown on less than 600 ha and the CAs stated that currently there are 2 600 crop/pest combinations for which there are less than three modes

of action in the range of authorised pesticides, with no authorised pesticides in some cases. Minor crops are economically significant and many speciality fruits fall under this category.

70. Private requirements of the food retail sector have helped to significantly reduce the risks associated with pesticide use in recent years. Typically growers of fruit and vegetables supplying German supermarkets must be members of quality assurance schemes, whose standards often go further than the legal standards and require extensive pesticide residue testing programmes. The CAs acknowledged that while these private requirements of supermarkets, commonly known as secondary standards, have significantly helped to reduce the risk associated with the use of pesticides, they believe that there are two ways in which supermarkets requirements may act as a barrier to IPM in the case of fruit and vegetable producers. Firstly, farmers are required to provide visually perfect produce without any blemishes. This requires very high pest control levels, which encourages the use of pesticides. They added that this desire for visually perfect fruit also directly contributes to food waste, as high quality food with superficial blemishes cannot be marketed through supermarkets.
71. Secondly, the CAs stated that some requirements of supermarkets make effective resistance management, which is one of the principles of IPM, very difficult. Länder advisory services stated that they adhere to good resistance management practices, as described in paragraph 52, when advising growers on crop protection. This involves recommending the use of products with different modes of action, where repeated applications are required on a crop. However, the CAs stated that many supermarkets have restrictions related to pesticides, including the number of active substances that can be found on the produce, and prohibition of the use of specific authorised pesticides. According to the CAs, this leads to a situation where growers cannot comply with good resistance management practices by using products with different modes of action, which they believe is very likely to lead to resistance problems. However, the CAs could not provide a specific example of the development of resistance, directly linked to grower's practices to comply with secondary standards.

Conclusions

72. The publicly-funded applied research, pest monitoring, decision support and advisory systems are the foundation on which IPM is based, and the need for continued and indeed increased investment in this infrastructure, particularly in advisory services, is critical to ensure the adoption of innovative IPM techniques by growers.
73. While professional users can access a vast amount of high quality information to guide their plant protection choices, to date, very limited progress has been made in developing officially recognised crop or sector-specific specific guidelines, which could act as a useful tool in the promotion of IPM.
74. Germany has succeeded in reducing the risks associated with pesticide use in line with the goals of the NAP, while the volumes of pesticides used have remained static or increased. Furthermore, this reduction in risk builds on a trend of risk reduction over the last 30 years.

5.12. RISK INDICATORS

Legal Requirements

Article 15 of Directive 2009/128/EC on risk indicators

Findings

75. The current NAP specifies a comprehensive range of 28 indicators to measure progress towards achieving the targets of the NAP. These indicators focus on trends in the risks associated with, rather than dependency upon, pesticides. These indicators can be summarised as follows;

- Number of MRL breaches,
- Number of instances of pesticides exceeding the environmental quality standards in surface waters,
- Proportion of water bodies with buffer zones permanently covered in vegetation, located at surface waters in the agricultural landscape,
- Residues of pesticides in small water bodies,
- Number of instances of pesticides exceeding the threshold value of 0.1 µg/l in ground water,
- SYNOPS - risk index for aquatic non-target organisms,
- SYNOPS - risk index for terrestrial non-target organisms,
- Number of confirmed instances of poisoning among bees,
- Residues of pesticides in bee bread,
- Proportion of compliance with the “necessary minimum”,
- Proportion of area/quantity of farms engaging in organic farming,
- Proportion of farms farming according to crop or sector-specific IPM guidelines,
- The extent to which biological plant protection measures are being used,
- Number of infringements of plant protection law,
- Availability of pesticides with various functioning mechanisms,
- Number of PAE with drift reducing nozzles/equipment,
- Sales of pesticides containing active substances causing particular concern,
- Funding situation - organic farming service provided by the Länder,
- Availability of Länder advisory services,
- Difference in yield between the untreated and treated crops,
- Area efficiency indicator defined as cultivated area per tonne of the crop,
- High Nature Value Farmland Indicator in accordance with Council Regulation (EC) No 1698/2005,
- Index estimating the environmental effects of plant protection activity,
- Trends in the populations of selected species of birds in agricultural landscapes,
- Level of infestation of important crops/sectors by typical harmful organisms,
- Agricultural area,
- Domestic sales of active substances,
- Treatment frequency index.

76. The PIX facilitates presenting the progress made, as measured by the indicators. PIX presents the results of the indicators, showing the initial value at the start of the Action Plan, the target value and the current position. The PIX does not provide a single figure based on aggregation of all indicators to form an overall measurement figure. The degree

of achievement of the target is stated as a percentage, thereby providing a very useful tool to inform the public at large, quickly and comprehensively of the progress made in each area. PIX data was first published in early 2016 with the results of 2015 and previous years. BLE updates the PIX annually, with the updated information freely available at www.nap-pflanzenschutz.de.

Conclusions

77. Germany has developed a comprehensive suite of indicators, some of which have been used for many years, to monitor progress towards achieving the sustainable use of pesticides. These indicators focus on risk, rather than dependency upon pesticides.
78. This progress in risk reduction is presented in a user friendly, intuitive manner, to facilitate dissemination of information and its understanding by non-experts.

6. MAIN OBSTACLES AND DIFFICULTIES ENCOUNTERED IN SUD IMPLEMENTATION

In the course of the mission, a number of difficulties in implementing the SUD were identified. These are summarised below, with more detailed description in the relevant sections of this report:

- Securing adequate funding for the Länder research and advisory services as described in paragraph 53. In the review of the 2008 NAP, Germany identified the Länder advisory services as having an important role in promoting the adoption of innovative IPM techniques.
- The development of crop specific guidelines, which the CAs consider as a critical step in changing the overall approach to IPM at grower level, as described in paragraph 58.
- The growing problem of resistance and the resulting difficulties in controlling economically important pests, as described in paragraph 67.

7. GOOD PRACTICES AND SUGGESTIONS FOR IMPROVEMENT OF IMPLEMENTATION

In the course of the mission, a number of good practices were identified. These are summarised below, with more detailed description in the relevant sections of this report:

- Pesticide container recycling scheme as described in paragraph 45. It is estimated that 75 % of pesticide packaging is disposed of through this scheme.
- Wholly publicly funded advisory services and systems for dissemination of timely plant protection advice operational in some Länder as described in paragraphs 53 and 62.
- Promotion of low drift nozzles as described in paragraph 27.

8. OVERALL CONCLUSION

Germany's NAP is the most recent manifestation of a thirty year project to reduce the risks associated with pesticides, through promoting their sustainable use to protect plants and plant products. Through a range of actions including equipment testing and training, the risks associated with pesticides had already been considerably reduced prior to the introduction of EU legislation in this area.

The current NAP sets clear targets and timelines to further reduce the risks and impacts of pesticides, and to provide growers with the tools necessary to produce high-quality, safe food. Considerable progress has been made under the current NAP, most notably, the continued reduction in the environmental risks associated with pesticides. The first formal overall review of the plan will be in 2018. The CAs have identified financial constraints limiting the effectiveness of public advisory services as an emerging risk to the sustainable use of pesticides.

The report highlights a number of good practices identified in the course of the mission, such as the publicly funded advisory services. The very high compliance rates throughout the pesticide marketing and use chain, and the successes in delivering tangible risk reduction, demonstrates that the overall German approach to the sustainable use of pesticides has achieved significant reduction in the risks associated with these products. Nevertheless, in the absence of effective and economically viable alternative controls to combat harmful organisms, the production of field crops in Germany continues to depend on pesticides.

9. CLOSING MEETING

A closing meeting was held in Bonn on 15 March 2017 with representatives of the BMEL, BVL, BLE, JKI, the Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety, MWVLW and the Ministry of Food, Agriculture and Consumer Protection of Lower Saxony. At this meeting, the mission team presented the findings and preliminary conclusions of the mission and CAs provided initial comments on these findings and conclusions.

The CAs thanked the mission team for their approach during the mission which facilitated open and frank discussions. They added that this mission and the mission series presented an opportunity for MS and the Commission to work together, taking an EU-wide approach to address secondary standards, and the consequences of their widespread application for resistance management and IPM.

ANNEX 1 – LEGAL REFERENCES

Legal Reference	Official Journal	Title
Dir. 2009/128/EC	OJ L 309, 24.11.2009, p. 71-86	Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides
Reg. 1107/2009	OJ L 309, 24.11.2009, p. 1-50	Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC
Dir. 2000/60/EC	OJ L 327, 22.12.2000, p. 1-73	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
Dir. 98/83/EC	OJ L 330, 5.12.1998, p. 32-54	Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption
Dir. 2008/105/EC	OJ L 348, 24.12.2008, p. 84-97	Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council
Dir. 92/43/EEC	OJ L 206, 22.7.1992, p. 7–50	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
Dir. 2006/118/EC	OJ L 372, 27.12.2006, p. 19–31	Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration