

## THE 3<sup>RD</sup> GERMAN ACTION PLAN ON SUSTAINABLE USE OF PLANT PROTECTION PRODUCTS – CONTINUITY AND NEW CHALLENGES

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### ABSTRACT

6 The EU requirements concerning plant protection have been supplemented by comprehensive national regulations. The core element of integrated plant protection, namely the reduction of risks to human health and the environment, is already addressed by the strict requirements for approval and proper use of a plant protection product (PPP). The main quantitative targets of the national action plan implemented 2008 are: (i) to reduce the risks that may arise from PPPs by 25% compared to baseline (1996 to 2005) by 2020, and (ii) to reduce the rate of exceeding maximum residue levels (MRLs) in domestic and imported food to less than 1% in each product group by 2021. The current results are published in the triannual report for the years 2008 to 2011 (with a 6-pages summary in English; [www.nap-pflanzenschutz.de](http://www.nap-pflanzenschutz.de)). Those obligatory and voluntary provisions ensure that the key target of reducing the risks associated with PPPs will be achieved. Important elements are applied research and demonstration mainly based on federal programs, resistant cultivars, biological and biotechnical control, decision support systems, thresholds, certification and inspection of sprayers, training, control schemes, incentives and efficient advisory services. Key technical tools of the action plan are networks of reference farms and demonstration farms. Both networks are valuable sources of robust data about plant protection in Germany. Furthermore, integrated plant protection is strongly driven by crop- or sector-specific guidelines which are mainly developed, implemented and controlled by producer associations. Based on the subsequent input from the federal states and interested groups and associations, the new action plan will come into force in spring 2013.

**Keywords:** Germany, MRLs, national action plan, reference farms, risk indicator

### 1 INTRODUCTION

In Germany, the use of plant protection products (PPPs) is regulated exhaustively, providing a high level of security and protection. The authorisation procedure for PPPs and legal provisions and licensing requirements governing their supply and usage are key pieces of legislation with which manufacturers, distributors, users, advisers and authorities must comply, as specified in plant protection law and other areas of law related to plant protection. Therefore, the two national action plans (NAP) since 2005 have aimed, in particular, at further reducing the risks associated with the use of PPPs, at reducing misuses and unnecessary usage, and at reducing the dependence of farmers on chemical PPPs. The second action plan from 2008 has two quantitative goals (Anonymous 2008): reduce the risks that may arise from

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PPPs by 25% as compared to baseline (1996 to 2005), and reduce the rate of maximum residue levels (MRLs) exceeding for PPPs in domestic and imported food to less than 1% by 2021. Key measures are: applied research and demonstration, resistant cultivars, biological control, decision support systems, thresholds, inspection of sprayers, training, control schemes, incentives, and efficient advisory services.

Historically, the first German action plan in 2005 was triggered mainly by changes in consumer purchase behaviour since the BSE crisis (e.g. more demand for organic food), and policy-environment changes (e.g. the Green Party entered the federal government from 1998 to 2005, and several state governments since 1990s). But, nevertheless, a national action plan has to consider that use of PPPs is an important tool for farmers to protect crop health and productivity, to help keep farms profitable and to ensure the high intensity in crop production. This requirement is consistent with article 4 of the sustainable use directive 2009/128/EC: "... Member States shall take account of the health, social, economic and environmental impacts of the measures ...".

Table 1. Use of reduced application rates as mean of 2007 to 2011 (Freier *et al.*, 2012)

Crop	Herbicides	Fungicides	Insecticides
Winter wheat	70% $\pm$ 3,6%	58% $\pm$ 1,5%	91% $\pm$ 3,4%
Winter barley	67% $\pm$ 4,7%	54% $\pm$ 1,7%	93% $\pm$ 2,0%
Winter oilseed rape	74% $\pm$ 0,9%	85% $\pm$ 3,7%	99% $\pm$ 1,8%

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In Germany, 27.000 to 35.000 tonnes of active ingredients of PPPs have been sold annually since 1994 with an increase over the years, in spite of two action plans since 2005. This slight positive slope has particularly been caused by strong decline of fallow land, continuous increase of low tillage systems (more glyphosate needed), more early sowing fields, new harmful organisms, and application of resistance strategies. Overall, PPP resistances have appeared more frequently in recent years which has contributed to the reluctance of farmers and advisors against the use of reduced dose rates (table 1), and sticking to the schemes of efficient resistance strategies, i.e. the use of full dose rates and a variation of modes of action. Variation in annual sales of PPPs is also influenced by weather conditions and price fluctuations.

## 2 DEFINITION OF TERMS

Integrated plant protection (IPP) was firstly announced in legal documents as an overall concept in Germany's plant protection act of 1986. The definition has not changed to date: *IPP is a combination of measures - with priority consideration of biological and biotechnical measures, resistant cultivars, and cropping and cultural control measures - where the use of chemical plant protection products is restricted to the necessary minimum.* IPP is divided into general principles and crop- or sector-specific guidelines. Whereas general principles describe rules for decision making in plant protection as scope of action, crop- or sector-specific guidelines contain a detailed set of different measures. Their voluntary implementation needs support. IPP guidelines can also contain further measures beyond plant protection, such as elements of conservation of biodiversity.

The treatment frequency index (TFI) is used as indicator of intensity of PPP uses. It considers dose reduction in proportion to the authorised one and partial field application of each PPP. For example, authorised dose in entire field means a TFI of 1,0, half dose in entire field 0,5

and half dose in half field 0,25. In tank mixtures, PPPs are separately counted. The TFI in main crops is determined with robust statistical surveys since the year 2000 and with data from the network of reference farms since 2007 (table 2).

Table 2: Treatment frequency indexes (TFI) in main crops in reference farms in the period 2007 to 2011 (Freier *et al.*, 2012)

<b>Crop</b>	<b>Herbicides</b>	<b>Fungicides</b>	<b>Insecticides</b>
Winter wheat	1,90 ±0,10	1,96 ±0,15	1,02 ±0,15
Winter barley	1,64 ±0,09	1,28 ±0,11	0,52 ±0,27
Winter oilseed rape	1,70 ±0,10	0,82 ±0,19	2,66 ±0,35

The necessary minimum in plant protection is the term used to describe the amount of PPPs needed to ensure crops are successful, not least as regards their economic viability. It assumes that all other practicable options to prevent and deter harmful organisms have been exhausted and that consumer, environment and user protection provisions have been adequately taken into account. The necessary minimum is determined on a regional base with data from the network of reference farms since 2007 (table 3).

Table 3: The necessary minimum in use of PPPs in reference farms (Freier *et al.*, 2012)

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<b>Crop</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Winter wheat	88,7 %	85,8 %	89,8 %	89,2%	91,8%
Winter barley	94,8 %	84,9 %	86,0 %	90,6%	93,8%
Winter oilseed rape	87,7 %	81,8 %	87,4 %	89,3%	91,4%
Field vegetables	83,4 %	89,8 %	86,7 %	87,3%	94,4%
Apples	94,5 %	94,6 %	91,7 %	95,3%	95,7%
Grapes	99,5 %	95,5 %	98,3 %	97,5%	96,0%
Hops	100 %	96,6 %	98,8 %	82,5%	94,0%

The key risk indicator in the action plan is SYNOPSIS (an acronym of: synoptic assessment of risk potential of chemical plant protection products). SYNOPSIS considers 2 aquatic and 3 terrestrial organisms in each PPP group (insecticides, fungicides, herbicides). There are 3 different types available: SYNOPSIS-Trend to assure tracking of risk trends and risk development on a national level; SYNOPSIS-GIS for regional risk analysis and provisional detection of hot-spots based on surveys on PPPs and extended GIS datasets on land use, slope, soil types, and climate; SYNOPSIS-WEB to compare PPP use strategies under real farm conditions. This online platform can be used by researchers, farmers or advisers.

### 3 THE NEW GERMAN ACTION PLAN

The 3<sup>rd</sup> German action plan expected in spring 2013 will be based mainly on the previous plan from 2008. Since 2009, there was a broad debate between federal ministries and agencies,

state ministries and plant protection services, and non-governmental stakeholder groups. The NAP will be modified and more specific: overall risk reduction by 30% with the reference period 1996 to 2005 by 2023, more integrated plant protection and organic farming with at least 20% organic fields and at least 50% farms that have implemented crop- or sector-specific IPP guidelines, restriction of PPP uses on the necessary minimum with at least 95% of all treatments, improvements in safe use of PPPs, reduction of exceeding of maximum residue limits (MRLs) with less than 1% until 2021, less impacts on biodiversity through more ecological infrastructures, and efficient water protection with fixed buffer zones (at least 5m) in specific areas. The possibility to expand buffer zones will be discussed. To reach these aims, measures are focused on applied research and demonstration, resistant cultivars, biological and biotechnical control, decision support systems, thresholds, certification and inspection of sprayers, training, and control schemes, incentives and efficient advisory services. In many cases, majority of these measures will be implemented through crop- or sector-specific guidelines of integrated plant protection. Progress of the action plan will be measured with a set of 28 indicators.

#### 4 RESULTS OF THE 2<sup>ND</sup> ACTION PLAN STARTED 2008

In 2011, 11 out of the 15 aquatic and terrestrial SYNOPSIS risk indexes had already reached the target of being no higher than 75% of baseline (in 2010 12 out of 15). The rate of meeting the target was therefore in 2011 about 73% ([www.nap-pflanzenschutz.de](http://www.nap-pflanzenschutz.de)).

The extent of the necessary minimum was determined by specific regional factors related to pest occurrence, and the pest control measures taken were selective and moderate in extent (table 3). From 2007 to 2011, 45.000 data sets were investigated. In 2011, PPP treatments in 762 fields on 85 arable cropping farms, 73 fields on 24 vegetable producing farms (cabbage, carrots, asparagus, onion), 57 apple orchards on 16 fruit farms, 27 vineyards on 9 viticulture farms, and 18 hop yards on 6 hop farms could be analyzed.

PPP residues and relevant metabolites in drinking water (0,1µg/l) were met at 95,4% of all measuring points in the ground water network during the last assessment period 2006 to 2008. The development since the period 1990 to 1995 is positive (table 4).

Table 4: Frequency scale of PPP findings in groundwater based on surface-close filtrated sampling sites (Hommel 2012)

PPP findings	1990 - 1995	1996 - 2000	2001 - 2005	2006 - 2008
Without findings	71,7 %	72,4 %	78,6 %	82,6 %
Detected 0,1µg/l	18,6 %	19,0 %	16,1 %	12,8 %
Detected >0,1-1µg/l	8,6 %	7,9 %	4,5 %	3,8 %
Detected > 1µg/l	1,1 %	0,7 %	0,8 %	0,8 %
Total > 0,1µg/l	9,7 %	8,6 %	5,3 %	4,6 %

Collection of maximum residue levels (MRLs) and evaluation of appropriate data needed to determine how well the target of reducing the rate of non-compliance with MRLs for PPPs in food had been met was possible for the first time in 2009. In order to make statements regarding non-compliance rates in the individual product groups, data on all products in the respective group must be considered. Currently available results of MRLs have shown that

exceedance in domestically produced food is less than 1%, in imports from the EU below 2%, and in imports from 3<sup>rd</sup> countries about 3% (Hommel 2012).

## 5 CONCLUSION

The national action plan started in 2008 has contained already aspects of the sustainable use directive 2009/128/EC. There was only a revision needed. Broad public debates and stakeholder participation (through conferences, workshops, temporarily installed working groups) have taken place since 2002. There was a need to strengthen advisory services, field experiments and research. Partners agreed to focus on voluntary initiatives instead of regulatory rules. Data acquisition and indicators are considered as important tools to measure progress of the action plan. A network of reference farms since 2007 has supported data acquisition and decision making. Installation of demonstration farms to spread knowledge in IPM has started in 2010. Outcome information is incorporated in regular training of farmers, advisers and trainers. The permanent “Forum of the action plan” where all stakeholders are represented is continued. Transparency and dissemination of information will be improved (e.g. via [www.nap-pflanzenschutz.de](http://www.nap-pflanzenschutz.de), newsletter).

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