



Federal Ministry
of Food, Agriculture and
Consumer Protection

National Action Plan on Sustainable Use of Plant Protection Products

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1. Introduction

Plant protection is necessary to protect our plants, particularly crops, against diseases, pests and non-parasitic disorders. It makes its value and benefit evident for agriculture and forestry, as well as for horticulture, particularly by reducing yield losses and securing the quality of crops. Plant protection also provides a substantial benefit to society as a whole. It contributes to securing business farms' incomes in agriculture, forestry and horticulture, and thus also to the securing of employment in rural areas. It is an important factor in enhancing the efficiency of crop production on open land and in securing the harmlessness of these products in terms of health. For instance, this also includes avoiding mycotoxins in food and animal feed. A high degree of area efficiency also contributes to limiting excessive use of land area. This benefits nature protection and the conservation of a sufficient level of biodiversity.

Reducing harvest losses by means of sustainable plant protection also contributes importantly to the securing of world food supplies and simultaneously also to the sparing use of what in many instances are overstretched natural factors of production. Thus protection of plants and of stored products is also of great significance for developing countries, which often lack food security. There, as elsewhere, it is also right to pursue the most far-reaching limitation to the use of chemical plant protection products, by means of measures advancing integrated plant protection, particularly in view of the challenges, with in many instances badly trained operators of plant protection products and inappropriate resources for storing plant protection products.

Plant protection should be viewed as an all-embracing term, not solely limited to the context of application of plant protection products. In Germany, the rules governing the implementing of plant protection and, in particular, approving and applying plant protection products, are regulated on the basis of EU law; this is done comprehensively and at a high level of protection for humans, animals and the environment, including surface water and groundwater. In addition, regulations on other areas of law, such as law relating to water, nature protection, chemicals, genetic engineering, hazardous substances, waste, transport or food, refer to plant protection issues and to dealing with plant protection products.

Among other reasons, the extensive specialist law relating to plant protection was created to protect crops and commodities against harmful organisms, in order to secure the yields and the quality of cultivated plants and products; it was also created in order to avert or prevent dangers and risks that can emerge through the use of plant protection products or other plant protection measures, particularly for the human and animal health and for the environment.

Nevertheless, to a varying degree, European Union Member States ascertain that chemical plant protection products and their metabolites are still to be found in water bodies, despite all legislative regulations and also despite use in accordance with good plant-protection practice; likewise, they find that bees and vertebrates are harmed and that there are exceedings of maximum residue levels for active substances used in plant protection products. The reduction in biological diversity that still persists in our agricultural landscape is also influenced by a variety of plant protection measures, among many other factors.

These facts have prompted European Union legislators to issue a requirement to all Member States to draw up a National Action Plan on Sustainable Use of Plant Protection Products, to implement it consistently and, where applicable, to develop it further. The deliberations relating

to the National Action Plan are stated in Article 4 of Directive 2009/128/EC of the European Parliament and of the Council establishing a framework for Community action to achieve the sustainable use of pesticides (Sustainable Use Directive). This stipulates that the National Action Plans must determine quantitative requirements, targets, measures and timetables for reducing the risks and adverse impacts that use of plant protection products represent for human health and the environment. In formulating and reviewing the National Action Plans, the Member States must take into account the health, social, economic and environmental impacts of the measures planned. This means that in each area the benefits and risks involved in plant protection measures must be taken into account in equal measure, independently of whether the measures in question are chemical or non-chemical. The aim in taking all factors into account in the development of the National Action Plans is to do justice to the objective of sustainability.

This National Action Plan on Sustainable Use of Plant Protection Products, produced by the Federal Government, was drawn up with the collaboration of the German States (the Länder) and the participation of groups of relevant stakeholders. It draws on experience gained with the National Action Plan, produced in 2008 by the Federal Ministry of Food, Agriculture and Consumer Protection, and coordinated with the Agriculture Ministers of the Länder. Apart from agriculture, forestry and horticulture, it now also encompasses the use of plant protection products in non-agricultural areas (e.g. municipal applications, sports grounds, areas designated for the public, such as parks or playgrounds, railway lines, industrial facilities) and also in home gardens and allotments. Targets are established in accordance with Article 4 of the Plant Protection Act (Pflanzenschutzgesetz; PflSchG) for plant protection, protection of operators, consumer protection and protection of the environment. Implementing the Action Plan presents a particular challenge to the Federal authorities and to the Länder, in view of the additional plant-protection activities necessary with regard to plant protection in research, in fostering projects, in monitoring, and in provision of advice.

In a targeted way, the National Action Plan directs efforts towards the reduction of risk, not towards across-the-board reductions in quantities of plant protection products. Across-the-board reductions of quantities of plant protection products sold overlook the benefit and the characteristics of the substances involved and the risks associated with their use. For example, such a quantity-based approach would more positively evaluate the use of a higher-risk plant protection product which takes effect with a lower quantity used, than it would the use of a lower-risk plant protection product which, by contrast, needs to be used in larger quantities. The reduction of risk is also the background to the Sustainable Use Directive's requirement restricting the use of certain active substances of particular concern.

The aim is that integrated plant protection and the broadening of organic farming lead to demonstrable reductions in the use of plant protection products; this is in addition to the goal of reducing risks to the human and animal health and to the environment, especially due to the preferred use of preventive, non-chemical plant protection products and also the continued reduction in use of chemical plant production products to the necessary minimum or necessary measure in the individual case. This process is reinforced by the use of suitable forecasting measures to detect the emergence of harmful organisms. An independent strategy developed by the associations representing organic farms, and involving those representing conventional farming, is pursuing the goal of reducing the use of plant protection products containing copper.

The Action Plan is a constituent part of the Charter for Agriculture and Consumers, produced by the Federal Ministry of Food, Agriculture and Consumer Protection and presented in 2012. This charter describes areas of activity and paths towards solutions: these build policies that are equipped for the future, along the entire food chain. This Action Plan remains woven into the National Biodiversity Strategy and into the sector strategy produced by the Federal Ministry of Food, Agriculture and Consumer Protection, as well as the National Sustainability Strategy "Prospects for Germany". It takes into account EU law currently in force - the EU Water Framework Directive, the EU Directive on the Conservation of Wild Birds and the Flora-Fauna-Habitat Directive - while affirming its commitment to the national and European framework requirements and strategies already mentioned. The Action Plan's objective is to make an effective contribution to attaining the goals of these already-existing regulations and thus also to plant protection that is viable for the future. In addition, the Action Plan takes into account recommendations made by the FAO and the OECD on risk-reduction issues in the use of plant protection products. Integrated plant protection plays the central role in this.

It is also a goal of plant protection to conserve healthy high-performance crops and to cultivate affordable products of high calibre. A further aspect of agriculture's sustainability and future viability is that of minimising adverse impacts of plant protection measures on biodiversity and continuing to reduce them so as to contribute to stopping the current loss of biological diversity. Apart from by means of reducing risks involved in the use of plant protection products, and (where applicable) also by reducing their use altogether, biological diversity can also be conserved by means of ecological focus areas: for instance, these can be in the peripheral areas or lower-yield subsections of agricultural areas; other initiatives include enriching the landscape with structural elements, setting up a comprehensive set of water body margins, targeted agri-environmental measures and the extension of organic farming. Another concern of this National Action Plan in initiating these measures is to thus contribute effectively to the conservation of biological diversity as an essential element of the nation's natural heritage.

Moreover, the Federal Government's "National Research Strategy BioEconomy 2030", published in 2010, emphasises that plant protection is an indispensable constituent part of securing agricultural production and the protection of food stocks, as well as the protection of natural resources, e.g. forest areas supplying untreated wood. Unavoidable risks associated with this for humans, animals and the environment must be reduced. The National Action Plan takes up this challenge by taking particular account of applied research and also of promoting innovation in plant protection, including the cultivation of resistance breeding, with an open mind on methods in both these areas; the goal here is to further develop integrated plant protection and also plant protection in organic farming.

Beyond this, this National Action Plan does justice to Item 3 - "Drawing up of strategies to minimise and avoid risks" - of the Federal Ministry of Food, Agriculture and Consumer Protection's prevention programme aimed at consumer protection against health-threatening residues of plant protection products in food. The Cross Compliance regulations in force for plant protection provide additional support to the National Action Plan for Sustainable Use of Plant Protection Products.

In summary, the National Action Plan makes risk reduction a centre-stage issue, thereby supporting the legislative regulations on plant protection, but also on other areas such as protection of water bodies or biodiversity. Over the medium term this means that the use of integrated-plant-protection measures and also of plant protection in organic farming will increasingly involve not using plant protection products at all. In this regard it is urgently necessary to inten-

sify public and private work in progress on scientific and practical foundations for developing, demonstrating and providing advice on such measures: the objective in this is to be able to offer potential users of plant protection products a sufficient portfolio of measures that are effective enough and are justified in economic and environmental terms.

2. Starting point

With its "Reorganisation of Plant Protection Act" of 6 February 2012 and with its "National Action Plan on Sustainable Use of Plant Protection Products", Germany is transposing into its national law the Directive 2009/128/EC of the European Parliament and the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (the Sustainable Use Directive). The subject matter of the Sustainable Use Directive is to reduce the risks and adverse impacts on human health and the environment that are associated with the use of plant protection products; it is also to foster the use of integrated plant protection as well as alternative approaches or measures such as non-chemical alternatives to plant protection products (Article 1). For this purpose, the National Action Plans must contain quantitative requirements, targets, measures and timetables (Article 4). The measures planned are required to take into account health, social, economic and environmental impacts. Thus, the starting point of plant protection substantially determines the targets and the measures adopted in this National Action Plan.

The structure of the National Action Plan is carefully delineated in terms of topics. It has global targets and – related to the individual areas for protection – subordinate targets that are either qualitative or quantitative, and with or without timetables. Measures are stated for reaching the targets, as are the groups of stakeholders responsible for the implementation (Federal Government, Länder, other public authorities, and associations, among other relevant groups). Indicators are used to help in regularly checking the achievement of the target due to successful implementation of measures that are allocated to those involved. The indicators are summarised via the PIX German Plant Protection Index: its task is to show the degree of attainment of the National Action Plan's targets. All measures and indicators are allocated to at least one target; none of the Action Plan's targets are without associated measures to take. The Federal Government holds the responsibility for reporting on and evaluating the National Action Plan. The Länder are actively involved and groups of relevant stakeholders participate.

The aim in the following description of the situation at the outset, edited for succinctness, is to summarise the situation and the knowledge that is held on plant protection matters in Germany for the different target sectors, at the date of the National Action Plan's entry into force. The results of the National Action Plan on Sustainable Use of Plant Protection Products, begun in Germany in 2008, are presented comprehensively in the report for 2008-2011 (Reports from the Julius Kühn-Institut, Volume 165, 2012, 162 pages). The report is also available at www.nap-pflanzenschutz.de.

2.1 Starting point: operator protection and safe use of the product with regard to bystanders

When approving plant protection products, requirements and provisions for use are issued for the protection of operators, workers, bystanders and residents, so as to rule out dangers and unacceptable risks for human health. Requirements and provisions for use are established in the context of a risk assessment according to Regulation (EC) No 1107/2009 concerning the Placing of Plant Protection Products on the Market, the Plant Protection Act (PflSchG) and the

statutory provisions according to hazardous-substances law. Information on problems regarding the protection of operators and the safety of bystanders is registered via the monitoring activities at Länder level; it is documented via reports on instances of poisoning, produced according to Article 16e of the Chemicals Act (Chemikaliengesetz; ChemG). However, the Federal Government does not have at its disposal sufficient information or data that indicates on a representative basis either the extent to which there are any problems in the area of protection of operators or of bystanders, or the extent to which the requirements are in fact being complied with by the operators of plant protection products.

Activities are currently in progress on "Operator, Worker, Bystander and Resident Exposure and Risk Assessment" at the European Food Safety Authority (EFSA) and also in EU projects (BROWSE, ACROPOLIS) to apply guidelines and models for indicating the risks and the level of protection of groups affected, particularly operators, workers, bystanders and residents. The aim in using complex models is to provide support in the approval of plant protection products and risk management, before, while and after the product is used.

2.2 Starting point: consumer protection (food safety)

The Sustainable Use Directive makes formulations for the further reduction of risks and adverse impacts from the use of plant protection products, for various areas, including human health.

Time and time again, despite considerable improvements, it has been evident in the past that there are exceedings of maximum residue levels of plant protection products, both with regard to products from Germany and other European Union Member States and also, in particular, to products from third countries. It is prohibited to market the foods thus affected. However, an exceeding of the statutory maximum residue levels for plant protection product does not in itself constitute a risk to health; this is because in most cases the content levels are far below the toxicological threshold values for an acute and chronic health risk. Due to the ban on use of chemical-synthetic plant protection products in organic farming, evidence indicates that products from such sources generally contain few or no residues of plant protection products.

The Federal Government has acted upon the German Bundestag's resolution of 16 October 2008: the Bundestag requested a reduction of the ascertained exceeding of maximum residue levels to below one per cent in all product groups.

First partial assessments from the results of monitoring activity by the Länder in the years 2009 and 2010 applied a representative approach to assessing the situation regarding residues; this shows that exceedings of the maximum residue levels still showed levels significantly above 1 % in some product groups under consideration, among the foods examined on the basis of their places of origin.

2.3 Starting point: water bodies

Water bodies are the veins that give life to the landscape. They and the water cycle as a whole not only provide water for agricultural production and also drinking water: they also render numerous environmental services. By making entries in water bodies, plant protection products can have undesired effects on the environment; these can be proven in water bodies, and checks continue to reveal infringements of threshold values and of environmental quality standards in groundwater and surface waters.

As regards the polluting of water bodies by plant protection products, organic farming draws less criticism as it operates a complete ban on chemical-synthetic plant protection products. The goal - to reduce the negative impacts of use of copper in organic farming on the ecological condition of the water bodies and the soil - is being pursued via research, providing advice to operators, employing strategies of minimisation and substitution, and the relevant associations' self-imposed obligations.

For groundwater, the "Report on the Composition of Ground Water - Plant Protection Products - Reporting Period 2001 to 2008" issued by LAWA (a joint Federal-Länder working group on water-related issues), points out that from 1990 to 2008 there was a reduction in the quantity of water-body measuring points at which there was an infringement of the threshold value of 0.1 µg/l for plant protection products, as defined by the Drinking Water Directive. However, it should also be stated that the decline in instances of pollution of the groundwater is essentially attributable to declining numbers of findings of Atrazin, Desethylatrazin and a small number of other active substances and metabolites, the use of which has already been banned for years or even decades. The level of pollution of the groundwater resulting from approved plant protection products is relatively low and has not changed significantly over the whole period under consideration.

Apart from the groundwater as a main source of untreated water used for obtaining drinking water, ca. 25 %¹ comes from surface water, albeit with widely varying proportions from region to region. For such sections of water bodies, studies indicate that in some cases values exceed the threshold value of the Drinking Water Directive (Trinkwasserverordnung), namely 0.1 µg/l - which is a value used solely for assessment and not legally binding in nature here. In the years 2006 to 2008, the drinking-water threshold value of 0.1 µg/l for active substances in plant protection products was not exceeded at 95.4 % of the water-body measuring points.

The water supply companies are continuing to collect data on residues of plant-protection products in untreated water, within the framework of their self-monitoring operations. These results provide evidence of levels of pollution that are present in the groundwater and surface water in the catchment areas of the abstraction plants for drinking water.

Implementing the Water Framework Directive (WFD), the requirements of which state that by 2015 all surface waters and coastal water bodies must be in a "good chemical and ecological status", residues of certain plant protection products in surface waters are monitored. The results of the WFD monitoring, in which the Länder invest much effort and resources, can be employed in assessing the situation regarding pollution caused by plant protection products in the groundwater bodies and the surface water bodies, concerning catchment areas larger than 10 km². The Länder monitor many of these using methods stipulated according to the WFD. The data generated are made available annually to the Federal Environment Agency (UBA), based on a General Administrative Regulation. For reporting to the European Commission, as well as to the European Environment Agency and to environmental reports that summarise data, the Federal Government has at its disposal data from the overview measuring network: this encompasses around 400 measuring points, primarily at larger water bodies.

The reason for entries of active substances used in plant protection products or their metabolites into the groundwater or surface water is often to be found in the products being used in applications that are inappropriate or not in accordance with their designated purpose, e.g. on

¹ BDEW German Association of Energy and Water Industries - Statistics 2011

hard surfaces outside agriculture. Other reasons include inappropriate cleaning of the sprayers, resulting in entries into water bodies and sewage works (entries from point sources). There are still gaps in knowledge regarding the extent and the relevance of entries of plant protection products sourced from applications that involve improper use, inconsistent with the product's designated purpose, on farmed or non-cropped land (e.g. paths and squares, railway lines, industrial facilities, airports).

Reference should also be made to possible entries from the use of biocides containing active substances from plant protection products (e.g. herbicides in roofing felt or fungicides in paints applied to the exteriors of houses); these cannot yet be quantified more closely.

The report on implementation of Directive 2006/11/EC, regarding pollution caused by certain dangerous substances discharged into the aquatic environment of the Community, as well as daughter directives on this topic, shows that at some surface waters in the catchment areas of the Rhine, Ems, Weser, Elbe and Maas rivers and the North Sea respectively, there have been infringements of the quality targets set for one or more active substances in plant protection products – both for approved plant protection products and also for others no longer approved. In essence, the instances of pollution of water bodies by active substances in plant protection products affect waters that have a large proportion of area under agricultural use in their catchment area. Pollution due to plant protection products is mainly the result of pathways from point sources, originating from municipal waste water treatment plants in rural areas.

The substantial part of the pollution of water bodies by plant protection products is because there is still not enough compliance with existing regulations and recommendations, governing the emptying out of residues in the proper manner and the cleaning of the plant protection equipment. Other important entry sources include a variety of entries from agricultural areas due to spray drift and run-off after precipitation events, or via drainage.

Research results on the condition of small water bodies in agricultural landscapes (standing water bodies and flowing water bodies, catchment area < 10 km) show that the concentrations of active substances of plant protection products in small water bodies exceed the level that is harmless to the environment and that, in many instances, a good chemical and ecological status has not yet been reached. As a basic principle, small water bodies are particularly exposed to a variety of entries or to entries from point sources, if they are located in the catchment area of agricultural lands on which plant protection products are used. There are various reasons for the pollution in these water bodies at present, due to residues of plant protection products. There is no monitoring of small water bodies by public authorities. Because of the measurement network that would be necessary for this, it would go beyond the scope of the Water Framework Directive monitoring requirements and the possibilities and resources of the Länder for a public monitoring of water bodies.

Over the last twenty years, the approval procedures for plant protection products in relation to the environment have constantly been adapted to the latest progress in science and technology and refined as a result. Thus, since 1994 provisions for use have been formulated defining distances from water bodies which must be maintained for the use of the respective plant protection product. This was later followed by provisions for use relating to terrestrial infrastructures.

In order to avoid the deposit of plant protection products in the groundwater and surface waters or to reduce it, there have for many years been specific preventive measures which are continuously further developed and adapted to latest developments in science and technology (among

others, application technology, minimum-distance requirements); however, more far-reaching measures are necessary to improve the situation regarding pollution and to achieve a good chemical and ecological status for our water bodies.

2.4 Starting point: biological diversity

Biological diversity – also abbreviated to "biodiversity" – has an intrinsic value, to be viewed independently of economic considerations. However, biodiversity is also an existential foundation for human life: plants, animals, fungi and micro-organisms sustain the materials cycle – they purify water and air, provide fertile soils and a balanced climate, they serve human needs for food and health; they are also the basis and the impetus for innovations offering the prospect of viability for the future. Only if nature is intact is it possible for current and future generations to have a high quality of life, (among other means) through natural products and landscape that give people recreation and also the roots of their regional identity. Biodiversity is also an irreplaceable element of nature's capital. It enables environments and production areas to maintain a high capacity for absorption and an ability to regenerate themselves. It provides essential support to the economy and society in making use of nature and the landscape. Aside from services provided by agricultural environments, agriculture uses biodiversity not least in the form of a wide spectrum of crops and farm animals and their genetic resources.

In the agricultural landscape, the shape that biological diversity takes is determined by the area's mix of environmental assets (e.g. the presence of woodland copses, flower strips, water body buffer zones, etc.), but also to a significant degree by the way in which land is used for agriculture. Plant protection measures form part of this use and thus part of the factors influencing biodiversity, because directly or indirectly they exert an influence on living entities in the agricultural landscape. They influence the quantities of wild herbs and insects, a fact that (for example) has an effect on the availability of food for many wild animals. For decades now, paralleling the development of agriculture and plant protection that aims at raising yields and efficiency with enhanced productivity, a sustained and extensive decline in biological diversity is also observable, one which affects many species in the agricultural landscape due to the structural change in agriculture.

Many species that previously were frequently to be found on lands run by farming communities have now become rare or are experiencing sustained and steep decline. The National Biodiversity Strategy adopted by the Federal Government aims to reverse this enduring negative trend by 2020. It describes targets and measures – these also include the National Action Plan on Sustainable Use of Plant Protection Products, mentioned in the National Biodiversity Strategy and also in the Agricultural Biodiversity Strategy.

Within this, organic farming can be expected to make a valuable contribution to the restoration of biodiversity in the agricultural landscape, not least due to the ban on chemical-synthetic plant protection products and the numerous crop rotations.

2.5 Starting point: agriculture, forestry and horticulture

The availability of a sufficient spectrum of suitable measures for plant protection, including suitable and approved plant protection products as well as practicable non-chemical alternatives, exerts a substantial influence on the capacity to implement integrated plant-protection measures – particularly also for effective resistance strategies – and on the necessary minimum to use when applying plant protection products. In this context, traders take on a particular role due to their often independent requirements relating to the reduction of maximum residue lev-

els. For instance, setting limitations on groups of active substances can make it more difficult to implement effective resistance strategies in practice.

It is only in relation to a few crops and product areas that there is sufficient availability of plant protection products in Germany. While the major crop category includes approx. 10 to 15 crops, in Germany there are more than 400 minor crops being farmed for which there are not enough suitable plant protection measures. This can endanger the economic existence of the farms affected. For instance, the minor crops include numerous vegetable crops which can be of major significance primarily for regional production or regional dietary customs.

On its website, the Federal Office of Consumer Protection and Food Safety (BVL) publishes the list of approved plant protection products and the annual quantities of active substances of plant protection products that have been sold (<http://www.bvl.bund.de>). An overview of available non-chemical plant protection measures can be found on the website of the Julius Kühn-Institut (JKI) in the topic-specific portal on non-chemical plant protection measures (<http://alps.jki.bund.de>).

In part, narrowed crop rotations have been a consequence of the increased level of specialisation among farms, the increase in cultivated area, economic necessities and market-policy requirements, as well as economic incentives favouring certain crops. A narrower crop rotation can thus lead to a greater use of certain plant protection products, because such a rotation encourages certain harmful organisms.

It is also observable that, in part, due to the prevailing economic environment, farms are favouring lower-cost plant protection products and dispensing with a necessary switchover of active substances. Due to a low level of practicability or due to economic constraints, non-chemical plant protection measures are little used or are not available, particularly in arable farming systems.

The last decades have seen an increase in the emergence of resistances to plant protection products with regard to disease, pests and weeds. Reasons for this include, among other things, the increasingly evident decline in the quantity of available active substances with different mechanisms for taking effect. In addition, changes in the structure of agricultural production, arising from economic considerations and not attributable to plant-protection issues, have contributed to the risk of the emergence of resistance.

Functioning and effective resistance strategies are possible solely through an approach coordinated between the public authorities involved, the scientific community, professionals giving specialist advice, and manufacturers of plant protection products, as well as food retail and those using the products in practice. There are already activities in progress within the framework of international groups of experts, at the European and Mediterranean Plant Protection Organisation (EPPO) and in national committees of specialists. In the approval procedure for plant protection products, it is a requirement to assess the resistance risk of the harmful organisms affected and also resistance strategies.

National committees of specialists for the groups of plant protection products serve as the forum for coordinating the activities on resistance-related topics that are undertaken by the relevant Federal authorities, the plant-protection service units at Länder level, and the producers and distributors of plant protection products. The purpose of these specialist committees is to examine issues related to the sustainable use of plant protection products, including questions

of evaluating resistance. They are comprised of specialist representatives of the Julius Kühn-Institut, the Federal Office of Consumer Protection and Food Safety (BVL), research institutions, the public plant-protection service, advisory services on agricultural and horticultural issues, and the owner of the approval or respectively the applicant.

The protection of stored products represents another area of activity and a further need for action. Here it is not solely a matter of securing the yields while in storage, but also of avoiding the destruction of food and feed that is no longer able to be brought to market - due to insufficient protection of stored products. The possibility to use chemical methods in protecting stored products has declined steeply over the last years. The specialist view is that at present the range of available measures for storage protection (incl. plant protection products) cannot guarantee sustainable storage protection. This can be exacerbated by the challenge of resistance.

2.6 Starting point: field productivity

Efficient land-use management is an important condition for being able to sustainably meet the increasing demand for safe and high-quality food and feed, raw materials and energy. Conserving area productivity and sustainably increasing it, adapted to the respective local characteristics, remains an important challenge for agriculture and forestry as well as horticulture. This explicitly includes the development potential in organic farming.

Pests, diseases and certain weeds can lead to losses of yield, declining quality, obstacles to the harvest and risks to consumers (e.g. due to fungal toxins). Plant protection measures, including the use of plant protection products, are thus indispensable for securing yields, for protecting consumers, ensuring efficient use of resources and for the competitiveness of the agricultural or horticultural farms. This also applies to the organic farms.

2.7 Starting point: non-farmed land

The use of plant protection products on non-farmed land (e.g. paths and squares, railways, industrial facilities, airports) is prohibited in Germany as a matter of principle. It is essential to have an exemption from the competent authority at Land (state) level to use them: this is frequently tied to further conditions (e.g. producing a management plan that also includes provision for non-chemical measures). Among other factors, an exemption can only be issued if it does not run contrary to any public interest, the purpose being pursued is of urgent importance and cannot be achieved by another means without requiring an unjustifiable amount of resources.

On non-farmed land, the plant protection measures concentrate on eliminating unwanted plant growth, as well as on combating rummaging rodents, in order to conserve the safety of transport and of operations for technical, industrial and transport facilities.

Certain harmful organisms (in particular invasive species alien to the area) can also have adverse impacts on biodiversity, by forcing out domestic species: combating these organisms can also result in synergy effects for the balance of nature on non-farmed land.

At present, there is a large number of systems and equipment available for physically combating weeds: using them with appropriate intensity and under optimum conditions makes it possible to achieve sufficient success in fighting weeds. In densely inhabited areas – depending on the areas' composition – weeding by hand remains a significant factor.

The particular feature of non-farmed land is that the relevant areas are very diverse in terms of their composition and function. The control strategies for combating unwanted growth and the management systems used must be coordinated to suit this. In contrast to farmed land, in many instances it is not possible to consider the matter on purely economic grounds, as the costs of these combating measures are counterbalanced not by a direct economic benefit, but rather by safety on paths, railway platforms or bus-stops. In addition, there is a lack of statistical data regarding the use of plant protection products on non-farmed land.

2.8 Starting point: home gardens and allotments

Against the background of not legally required professional knowledge regarding plant protection products provided by home gardeners and allotment-owners, in 1999 in Germany specific requirements were established for plant protection products' approval and sale for use in home gardens and allotments.

In particular, these requirements relate to the suitability of active substances of plant protection products, as well as the dosing functionality and the shape and size of the packaging. It remains the case that when issuing plant protection products in this sector, one must bear in mind that a particular risk to human health is presented by what is often the direct proximity of children and old people both to the area, to the cultivated plant treated, and to the stored plant protection product and the packaging. It is imperative that this fact is particularly taken into account when approving and establishing provisions for use, packaging and disposal, and also for the labelling of the immediate containers of the plant protection products and of the packaging, as well as the comprehensive information provided to the buyer by the seller. Through these requirements, it has proved possible to attain a high level of protection in the home garden and allotment sector. Over the last years, no cases were reported of poisoning due to use of plant protection products used in home gardens or allotments.

It is the Länder that provide official advice on home gardening and allotment issues. In allotment associations there are frequently also often wardens who have professional knowledge. Some Länder operate a warning service for home gardeners and allotment-users, providing further training to advisers on the topic of integrated plant protection and good professional practice. The Internet serves as an important medium of information. Information materials are made available by many and varied providers, including the plant protection services, the manufacturers of plant protection products, and also the "aid infodienst" information service on food, agriculture and consumer protection.

The last nationwide survey on the use of plant protection products in the home garden and allotment sector was conducted in 2001. The Federal Government does not have more recent data available on the situation regarding plant protection in home gardens and allotments. However, reports produced by the plant protection monitoring programme show that unlawful uses of certain herbicides are more frequently in evidence on the non-farmed land bordering on the gardens (e.g. garage entrances, hard surfaces on courtyards, pavements). In particular, these illegal uses give rise to the danger of run-off of the active substances used in these herbicides into surface water.

2.9 Starting point: avoiding the introduction and spread of harmful organisms

Due to an increasingly global trade in plants and plant commodities, as well as to climate change, there is an increased danger of harmful organisms being introduced, threatening domestic agriculture and cultivated land. Thus, the system of phytosanitary hitherto in force faces new challenges and is, to a growing degree, not equipped to match this development. This chal-

lenge is taken on by national and European working groups and networks. On this subject, support is provided to the coordination of national research and the consultation given to political decision-makers via ERA-NET EUPHRESKO (www.euphresco.org). For Germany it is the Federal Office for Agriculture and Food (BLE) and the Julius Kühn-Institut that work on this.

The introduction of new harmful organisms can trigger off an additional need for use of plant protection products, in different cultivated areas or sectors or on non-farmed land, in order to eliminate or to repel the organisms, or to stem the infestation. Preventive measures (e.g. changing the crop rotation) and non-chemical alternatives must be developed and used on a preferential basis or - if available - integrated plant protection systems must (where applicable) be adapted.

3. Legislative foundations, current regulations

The directly applicable rulings in plant protection law relate to the approval of plant protection products, operator-related regulations, application-related regulations, area-related regulations, and also regulations relating to plant protection equipment and also to monitoring (Diagram 1). The central role is taken by the Plant Protection Act (PflSchG).

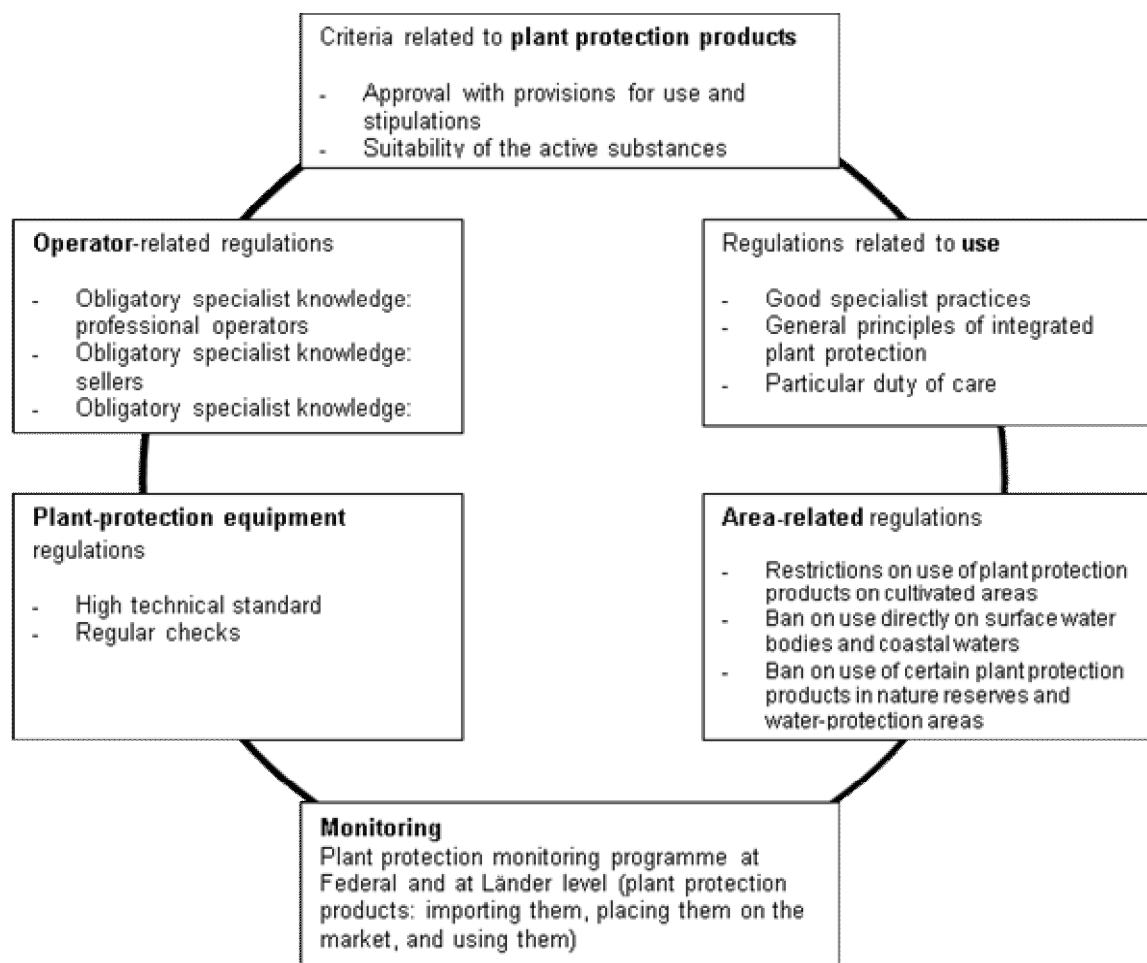


Diagram 1: Elements of the existing regulatory law on plant protection

Further important elements are the directly applicable Regulation (EC) 1107/2009 of the European Parliament and the Council, of 21 October 2009, concerning the Placing of Plant Protection Products on the Market, and also the Regulation (EC) 1185/2009 of the European Parliament and the Council, of 25 November 2009, concerning statistics on pesticides. Directive 2009/127/EC of the European Parliament and the Council, of 21 October 2009, amending Directive 2006/42/EC with regard to machinery for pesticide application, stipulates the requirements placed on new plant protection equipment; it has been transposed into national law by the Equipment and Product Safety Act (Geräte- und Produktsicherheitsgesetz).

An overview of the most important legislative regulations on plant protection is available on the website of the Ministry of Food, Agriculture and Consumer Protection (www.bmelv.de).

The approval of plant protection products is a core element in the reduction of risks which can emerge due to the use of plant protection products. It not only prevents unsuitable substances from being made available for trade: i.e. substances that entail dangers or unjustifiable risks for human beings (particularly for operators, workers, residents, and bystanders), animals, surface water, groundwater and the environment. Simultaneously, the requirement to obtain approval for plant protection products that are suitable in principle means that essential elements of their use are also regulated. This is brought about by determining the areas of application, the provisions for use and the stipulations that must be complied with by the operator or the owner of the approval. As a matter of principle, a precondition applying to the approval of plant protection products is that the stipulations of plant protection law are complied with on all levels. A separate evaluation procedure is used for the check on the suitability of plant protection products for the home garden and allotment sector and for areas that are designated for general public use.

The aim behind the individual regulations of plant protection law is to secure a high level of protection for humans, animals, and the environment, including surface water and groundwater. It is therefore absolutely necessary to have intensive monitoring of compliance with plant protection law and - where required - effective sanctions. The Federal Government and the Länder are working together closely on this, within the framework of the plant protection monitoring programme. Beyond this, legislative regulations relevant to plant protection are in force in other areas of law, such as law relating to water, nature protection, chemicals, genetic engineering, hazardous substances, waste, transport and food.

The Plant Protection Act (PflSchG) also regulates the respective areas of competence of the Federal Government and the Länder. Provision of advice on plant protection matters, protection of the aquatic environment, nature protection etc. are important areas forming part of the remit of the Länder and of significance for the successful implementation of the National Action Plan.

The necessary legislative body of instruments is available to secure proper plant protection and to eliminate deficiencies in implementation. Compliance with regulatory law also entails compliance with the general principles of integrated plant protection: these are integrated into the principles for the implementation of good professional practice in plant protection, as endorsed by specialists.

4. Legislative implementation of the Sustainable Use Directive

Article 4 of Directive 2009/128/EC of the European Parliament and the Council establishing a framework for Community action to achieve the sustainable use of pesticides (Sustainable Use Directive) places an obligation on the Member States to adopt National Action Plans for the Sustainable Use of Plant Protection Products. Germany transposes the Sustainable Use Directive into national law by means of the "Reorganisation of Plant Protection Act" of 6 February 2012: Article 1 of this document contains the new "Plant Protection Act" (PflSchG).

In the National Action Plans, the EU Member States establish their quantitative objectives, targets, measures and timetables for reducing the risks and adverse impacts of the use of plant protection products on human health and on the environment. In doing so, Article 4 (1) of the Sustainable Use Directive requires that the National Action Plans describe how they are implementing the measures pursuant to Articles 5 to 15 of the Sustainable Use Directive, in order to attain the directive's goals. They must also state how they are fostering the development and introduction of integrated plant protection, as well as alternative methods or procedures, in order to lessen dependence on the use of plant protection products. According to Article 4 of the Plant Protection Act, the targets set relate to the topics of plant protection, operator protection, consumer protection and protection of the environment.

The German Bundestag passed a resolution adhering closely to the framework of the Sustainable Use Directive as its guide in drawing up the content of the National Action Plan. The "principles for the implementation of good plant-protection practice", anchored in the Plant Protection Act (PflSchG), also serve the implementation of the Sustainable Use Directive. In addition, various directives have been adopted regulating plant protection in Germany.

4.1 Initial, additional and further training in plant protection

Article 5 of the Sustainable Use Directive is implemented, in particular, by Article 9 of the Plant Protection Act (PflSchG).

Professional operators and sellers of plant protection equipment and also advisors on plant-protection matters are subject to an obligation to possess a certificate proving appropriate professional knowledge and to undertake additional and further training measures at three-year intervals. Anyone placing plant protection products on the market in a professional capacity, or doing so on the Internet, must also provide evidence that he/she possesses the necessary professional knowledge to convey information to users. The Regulation on Professional Knowledge in Plant Protection (Pflanzenschutz-Sachkundeverordnung) states the details. From the end of 2015, such evidence becomes a precondition for the sale of plant protection products.

4.2 Stipulations for the sale of plant protection products

Article 6 of the Sustainable Use Directive states stipulations for the sale of plant protection products: these are transposed into national law by Article 23 of the Plant Protection Act (PflSchG).

As of 26 November 2015, plant protection products approved solely for professional users may only be issued to individuals who have the evidence of specialist knowledge and who present this to the issuing party. Accordingly, issuing products through automatic vending machines or self-service arrangements is prohibited. In addition, the issuing party must inform the buyer about proper use in accordance with the designated purpose, as well as about bans and restrictions that apply to the plant protection product. Regulations issued according to Article 17 of

the Chemicals Act (ChemG) contain further restrictions and provisions. When issuing plant protection products to non-professional users (e.g. hobby gardeners) the issuer must inform them about the risks of use, and also about preventive measures with regard to storage, handling and application, as well as safe disposal. In the event of repeated infringements against these stipulations, the public authority with relevant competence is required to prohibit issue of product to the offending distributor, in whole or in part and for up to 5 years, as well as withdrawing the certificate of professional knowledge.

4.3 Information on benefits and risks of plant protection (including raising public awareness)

According to Article 7 of the Sustainable Use Directive, the Member States must undertake measures to inform the general public. In Germany, this is done via the websites www.bmelv.de and www.nap-pflanzenschutz.de, as well as a lot of further information on other authorities' sites at Federal and Länder level.

4.4 Use and monitoring of plant protection equipment currently in operation

In Germany, the check on the plant protection equipment in use, provided for by Article 8 of the Sustainable Use Directive, is regulated by Article 16 of the Plant Protection Act (PflSchG) and the regulation requiring checks on plant protection equipment.

This requires that plant protection equipment must be arranged in such a way that, subject to proper use in accordance with the regulations, it has no negative impacts on humans, animals, the groundwater or the environment if such effects are avoidable according to the state of the art. In the case of equipment with corresponding CE labelling this is presumed to be the case; this is also true of equipment that was entered in the Julius Kühn-Institut (JKI)'s list of plant protection equipment by 14 December 2011. If a test indicates that an item of plant protection equipment does not fulfil these conditions, a ban on use of the product can be issued.

If a plant protection product is subject to particular requirements when used with the aid of plant protection equipment, the use of the product is permitted solely if the plant protection equipment used is approved by the JKI or another certified testing centre and is also approved for the use of this plant protection equipment and listed.

Owners of plant protection equipment in use have an obligation to have it checked at regular intervals. For applying plant protection products it is solely plant protection equipment with a valid test-sticker that may be used.

4.5 Aerial spraying of plant protection products

As a matter of principle, Article 9 of the Sustainable Use Directive bans the aerial spraying of plant protection products.

Article 18 of the Plant Protection Act (PflSchG) transposes this into national law. The Länder authorities with relevant competence may approve exceptions if there are no other comparable possibilities for an effective application, such as in a forest, for example, or on steep-slope vineyard, or if this type of application has fewer adverse effects on humans and the environment than the use of ground-based equipment does. Approvals like this are possible only for plant protection products which the Federal Office of Consumer Protection and Food Safety (BVL) has explicitly either approved or authorised and listed for aerial-spraying use. The details of the procedure are stated in the regulation concerning the aerial spraying of plant protection products.

4.6 Protection of the aquatic environment and of drinking water

The Sustainable Use Directive obliges the Member States, in Articles 4 and 11 and in reference to decision factor 5, to take suitable measures to protect the aquatic environment and drinking water supplies from the adverse impacts of plant protection products. Specific measures are stated in Article 11 (2): at the same time, this package of measures is not conclusive and can be extended, where applicable. These measures act in a supporting capacity to the relevant provisions of Directive 2000/60/EC and Regulation (EC) No 1107/2009 and are required to be compatible with them. The measures include the preferential use of plant protection products containing active substances that are not declared to be of particular concern, that are not classified as dangerous for the aquatic environment, and that contain no priority hazardous substances according to Article 16 (3) of Directive 2000/60/EC.

Against the background of a risk evaluation for many plant protection products, in processing an approval the Federal Office of Consumer Protection and Food Safety (BVL) issues provisions for use that determine minimum distances from water bodies. In addition, for reducing spray drift, the use of equipment compliant with certain reduction classes can be stipulated. The purpose here is to limit entries in surface water bodies in such a way that they cause no unacceptably adverse impacts on the aquatic communities.

There is also a requirement to stipulate measures that prohibit or reduce the use of plant protection products on or alongside streets, railways, very permeable surfaces or other infrastructure facilities close to surface waters or groundwater, as well as on hard surfaces, in instances in which there is a high risk of the material flowing away into the surface waters or into the sewerage system.

Article 12 of the Plant Protection Act (PflSchG) transposes this into national law. Similarly, measures in accordance with Article 11 of the Sustainable Use Directive are also stated in the following: the principles for the implementation of good plant-protection practice; the ordinance on usage bans for plant protection products; in addition to the ordinance on the principles of conservation of agricultural areas in a good agricultural and environmental condition (ordinance establishing rules for direct payments to farmers: Direktzahlungen-Verpflichtungenverordnung). The particular responsibility of the Länder for protection of the aquatic environment is also emphasised in Article 22 of the Plant Protection Act (PflSchG).

Moreover, already-existing regulations make comprehensive provision for protection of water bodies and the improvement of the ecological status of surface water and groundwater. With its Ordinance on Protection of Surface Waters (Oberflächengewässerverordnung; OgewV) of 20 July 2011, Germany implements the requirements stated in Directive 2000/60/EC (Water Framework Directive: WFD) and in particular in Directive 2008/105/EC on environmental quality standards in the field of water policy (the Directive on Priority Substances or the Environmental Quality Standards Directive - EQSD, amending or repealing previous laws). Environmental quality standards for active substances in plant protection products are stated in the list of harmful substances specific to river areas that is designated for determining the ecological status of the surface waters (Surface Waters Ordinance (OgewV), Annex 5) and for determining the chemical status of the surface waters in the lists of Priority Substances (Surface Waters Ordinance (OgewV), Annex 7, Table 1), as well as for determining certain other harmful substances (Surface Waters Ordinance (OgewV), Annex 7, Table 2).

4.7 Reduction in the use of plant protection products or respectively of the risks associated with them in certain areas

In Germany, the Plant Protection Act (PflSchG), Articles 12, 17 and 22, implements the measures required in Article 12 of the Sustainable Use Directive. Article 12 of the Plant Protection Act (PflSchG) contains the stipulations for the use of plant protection products. They state that plant protection products may be used solely if they are approved, the approval has not lapsed, solely in the respective valid areas of application stated in the approval, and in accordance with the respective valid provisions for use stated in the approval. On a matter of principle, it is prohibited to use plant protection products on hard surfaces and also on other outdoor surfaces that are not used for agriculture, forestry or horticulture (e.g. embankments, un-cropped field margins). Article 17 regulates the use of plant protection products on areas designated for public use. In addition to the requirements in Article 12, on areas designated for the general public (such as public parks or green areas or school grounds), the only plant protection product that may be used is one that the Federal Office of Consumer Protection and Food Safety (BVL) has classified as being suitable for that purpose and has approved.

Article 22 of the Plant Protection Act (PflSchG) authorises the Länder (among other things) to issue stipulations regarding the use of plant protection products in protected areas in accordance with laws governing water management law or nature protection law.

4.8 Handling and storage of plant protection products and also treatment of the associated packaging and residual amounts

Article 13 of the Sustainable Use Directive obliges the Member States to take measures to ensure that human health and the environment are not endangered in the handling and storage of plant protection products or in the treatment of the associated packaging and residual amounts, whether by professional users or (where applicable) by sellers.

The Plant Protection Act (PflSchG) does not directly adopt these measures through regulations of its own, as there are numerous regulations in other areas of law on this topic.

The storing of plant protection products before their use is a matter regulated in Germany by, in particular, the regulations of the following laws: the Federal Water Resources Act (Wasserhaushaltsgesetz) (namely the Ordinance on Facilities for Handling Substances Hazardous to Water and on Specialist Firms – "VAwS"); the law on chemicals and hazardous substances (Ordinance on Hazardous Substances – GefahrstoffV; the Technical Rules TRGS10 - "Storage of hazardous substances in stationary containers"), construction law (Directive on Retention of Firefighting Water - "Löschwasser-Rückhalterichtlinie"; "RüRL"), and immission protection law (Ordinance on Facilities Requiring Approval - 4th Federal ordinance on immission protection (Anlagenverordnung – 4. BImSchV), and also in the requirements stating the principles for implementing good professional practice in plant protection.

The handling and transport of plant protection products are regulated in the law on the transportation of hazardous goods (GGBefG), and also in the regulation regarding transportation of hazardous goods within a country and across borders, by road, by rail and on internal waterways (GGVSEB).

Requirements regarding packaging and also regarding residual amounts of plant protection product are primarily determined by the Chemicals Act (ChemG), the Ordinance on Hazardous Substances (GefahrstoffV), and the Packaging Regulation (Verpackungsverordnung). For instance the Chemicals Act (ChemG) defines the packaging and labelling requirements for haz-

ardous substances. As regards handling of residual amounts, for example, this is a matter on which the Ordinance on Hazardous Substances (GefahrstoffV) gives general instructions.

Under the name PAMIRA, the manufacturers of plant protection products and agricultural wholesalers have been organising annual collection campaigns nationwide for the donation and safe disposal of empty packaging for plant protection products: this has been done voluntarily for over 20 years now (www.pamira.de).

4.9 Integrated plant protection

Integrated plant protection is anchored in Article 3 of the Plant Protection Act (PflSchG). It states that plant protection may be carried out solely according to good professional practice. In particular, it encompasses compliance with the general principles of integrated plant protection in accordance with Annex III of the Sustainable Use Directive.

5. Targets of the National Action Plan

5.1 General objectives of the National Action Plan (global targets)

Article 4 of the Plant Protection Act (PflSchG) stipulates that the National Action Plan - also taking into account measures of risk-reduction already taken - must contain quantitative objectives, targets, measures and timetables for the reduction of risks and adverse impacts of the use of plant protection products on human and animal health and also on the environment. The target requirements relate to the area of plant protection, operator protection, consumer protection and protection of the environment.

The global targets relate to these requirements and are elaborated in fuller detail in the specific descriptions of targets. Specific requirements and timetables also underpin attainment of the target. Examples of this are a 30 % risk reduction in the environment (water bodies, the terrestrial environment) by 2023 or, regarding consumer protection, the reduction of exceedings of the maximum residue values to levels below 1 % by 2021.

However, goals stated in other strategies also form part of this, such as the goal in the National Sustainability Strategy aiming at a 20 % share of utilised agricultural area for organic farming: these can make important contributions to the attainment of the global targets. In this regard, the Sustainable Use Directive states that the development and introduction of integrated plant protection and also of alternative procedures and methods must be fostered, also in the organic farming sector.

Thus the global targets of the Action Plan are:

- The risks and adverse impacts associated with plant protection products for human health and the environment must be further reduced. This means the following:
 - = by 2023, there must be a 30 % reduction in the risks that using plant protection products entails for the environment (base: average value for 1996 – 2005),
 - = by 2021, the exceedings of the maximum residue levels must be reduced to below 1 % in all product groups for both domestically-produced and imported foods,
 - = the adverse impacts of use of chemical plant protection products must be further reduced for operators, workers, bystanders and residents.

- The introduction and further development of plant protection measures, involving limited use of plant protection products in integrated plant protection, must be fostered. This includes further extending the proportion of practicable non-chemical measures in plant-protection concepts, e.g. using biological, biotechnical or mechanical plant protection measures, and securing sufficient availability of active substances used in plant protection products for efficient resistance strategies.
- The use of plant protection products must be limited to the necessary minimum.
- Further improvements must be made to safety in dealing with plant protection products.
- Further improvement must be made to the provision of well-balanced information to the public, concerning the benefits and risks of plant protection, including the use of chemical plant protection products.

For all the measures associated with these targets in the National Action Plan, the health, social, economic and environmental effects must be taken into account, in accordance with Article 4 of the Sustainable Use Directive.

There are particular targets subordinated to these global targets: some of these can be expressed in quantitative terms and relate to plant protection, operator protection, consumer protection, and protection of the environment. These targets are presented as follows, together with timetables, set against a summarising description of the situation.

5.2 Targets: plant protection

5.2.1 Agriculture, forestry and horticulture

The farms' situation can be improved in economic, environmental and social terms by avoiding unnecessary plant protection applications. In addition, the effectiveness of chemical plant protection products can be retained by resistance strategies. The public recognition that plant protection receives can also be enhanced in the following way: through extending the use of guidelines on integrated plant protection specific to crops and to particular sectors; through participation in programmes aimed at controlled integrated farming or in quality-assurance systems; also through participation in further measures aimed at reduction of risks and adverse impacts resulting from the use of plant protection products. This also includes stored product protection.

The reduction of risk should also be attained by further technical improvements being made on plant protection equipment, and the reduction of the use of substances that cause particular concern – these are substances disqualified according to the exclusion criteria stated in Regulation (EC) No 1107/2009 – even before the expiry of their approval/authorisation. In this context, measures must be structured so as not to endanger the competitiveness of the farms, sustainability in rural areas, or the environment.

Table 1 states individual targets of this National Action Plan with regard to agriculture, forestry and horticulture.

Table 1: Targets, target quotas and timetable for agriculture, forestry and horticulture

Target	Target quota	Date
Reduction of use of chemical plant protection products that significantly deviate from the necessary minimum value (data set: network of reference farms)	95 % conformity with necessary-minimum requirement	ongoing
Maintaining, extending and/or strengthening the official service of provision of advice by the Länder, also involving the use of electronic media	no quantified objective set (advisors' index)	2018
Continuation of the Federal Program for Organic Farming and Other Forms of Sustainable Agriculture (BÖLN); evaluation of the results	no quantified objective set	open
Increase in the proportion of agricultural area on which work is performed according to the directive on organic farming (National Sustainability Strategy)	20 % of the agricultural and horticultural area	open
Drawing up of guidelines on integrated plant protection specific to crops or to particular sectors, for all relevant crops or sectors, with reference to the total agricultural area and to the intensity level of use on farms engaged in plant protection activities; this includes a systematic description and assessment of available methods of integrated plant protection	100 %	2018
Increasing the proportion of agricultural and horticultural farms working according to guidelines of integrated plant protection that are specific to crops or to sectors	30 % of the agricultural and horticultural farms 3 years after publication of the respective guidelines	ongoing
	50 % of the agricultural and horticultural farms 5 years after publication of the respective guidelines	ongoing
Improvement of the availability of plant protection products, particularly for minor uses, for stored product protection and for suitable resistance strategies	in 80 % of all relevant areas of application, at least 3 groups of active substances available	2023
Elaborating/formulating resistance strategies in order to ensure appropriate management for important crops and sectors	for 100 % of all relevant cultivated plants	2018
Raising the number of types of plant protection equipment that are listed by JKI as "loss-reducing" or "saving of plant protection products"	none	2018

Target	Target quota	Date
Reduction of the levels of issue of active substances classified as being of particular concern, the goal being to reduce risk	to be named on a basis specific to the given active substance/s	2018

5.2.2 Non-agricultural land

The criteria for the approval of plant protection products for use on areas of non-farmed land are stated in the Plant Protection Act (PflSchG). The applications are assessed by the Länder, based on the specific situation on the spot in accordance with the objectives of the Plant Protection Act (PflSchG). However, it seems purposeful to make the approval criteria of the Länder uniform to a still greater degree.

Plant protection measures on non-agricultural land must be optimised environmentally and economically. This includes non-chemical procedures and also the use of chemical plant protection products as an element in integrated plant protection. The aim in drawing up sector-specific guidelines for integrated plant protection is also to describe, more clearly than hitherto, the availability and possibilities for the use of non-chemical measures. Where applicable, this opens the possibility of not needing to apply for approval to use plant protection products on non-agricultural land (due to having an alternative). The guidelines contribute to transparency and acceptance among the general public for the measures to be taken.

Targets with reference to plant protection on non-agricultural land are stated in Table 2.

Table 2: Targets, target quotas and timetable for non-agricultural land

Target	Target quota	Date
Drawing up of sector-specific guidelines for integrated plant protection in relevant areas, including a systematic description and assessment of available methods for integrated plant protection on non-agricultural land	100 %	2018
Improvement of provision of information and advice, e.g. through development and implementation of training concepts, aimed at optimizing professional knowledge among operators, or establishment of systems of advice for integrated combating strategies and concepts for provision of care	none	ongoing
Uniform criteria for the approval of applications for an exemption permitting use of chemical plant protection products	none	2015
A greater taking into account of preventive measures for the monitoring of vegetation in the context of planning and building on non-agricultural land	none	ongoing
Reducing the proportion of non-approved uses	none	2018

5.2.3 Home gardens and allotments

In order to determine the current requirement for action in the area of home gardens and allotments, an up-to-date study must be produced, describing the present situation and highlighting possible areas for action. Beyond this, guidelines must be drawn up for integrated plant protection for home gardens and allotments: these must be disseminated effectively in terms of public communications.

Table 3: Targets, target quotas and timetable for home gardens and allotments

Target	Target quota	Date
Updating the knowledge base	none	ongoing
Review of the approval conditions for plant protection products used in home garden and allotment applications	none	2018
Strengthening the provision of advice and of information	none	ongoing
Guidelines on integrated plant protection for home gardening and allotments	100 %	2015

5.2.4 Targets: avoiding the introduction and spread of harmful organisms

Measures taken to avoid the introduction and spread of harmful organisms are already of major economic significance today. The measures are implemented on an ongoing basis. Thus the Action Plan is directed at the further optimisation of processes.

For avoiding the introduction and spread of harmful organisms and the management of unavoidable incidents, reference laboratories at Federal level are a decisive precondition for safe and prompt diagnosis and implementation of monitoring assignments. Permanent or ad-hoc working groups and networks across Länder boundaries contribute significantly to avoiding the introduction and spread of harmful organisms.

Table 4: Targets, target quotas and timetables: avoiding introduction and spread of harmful organisms

Target	Target quota	Date
Reducing new introductions of harmful organisms	none	ongoing
Efficiently combating new harmful organisms. Setting of priorities in instances of combating harmful organisms, according to the risk potential. This includes (among other things) rapid risk analyses and decisions.	none	ongoing
Efficient monitoring systems for existing harmful organisms	none	ongoing
Strengthening of prevention; documentary proof of absence of pathogens in transit through third countries, in the case of high-risk material; agreeing preventive measures with certain export countries	none	ongoing

Target	Target quota	Date
Improvement of the co-financing possibilities in order to implement combating measures	none	2018
Cooperation in the setting of standards in the International Plant Protection Convention (IPPC) for harmonizing plant-health requirements	none	2018

5.3 Targets: operator protection and the protection of bystanders

Plant-protection measures need to be optimised with regard to operators' safety. In addition, programmes of initial, additional and further training and also checks must be set up, for fostering the process of dealing safely with plant protection products. With regard to reducing exposure on the part of individuals who can be exposed to spray drift or to the application of plant-protection products (this includes the following: the operators of plant protection products; the workers subsequently working on sprayed areas of land or in treated enclosed rooms; residents of areas on which plant protection products are used; bystanders, such as observers or individuals taking a walk), measures must be established which inform the public about the risks and the measures involved in avoiding unwanted exposure and reducing spray drift and pollution of non-target areas by plant protection products. In order to assess further measures aimed at improving protection of operators and of bystanders, the actual situation must be assessed on a representative basis, to determine further needs for action.

Table 5: Targets, target quotas and timetable: protecting operators and others who can be exposed to spray drift

Target	Target quota	Date
Description of the need for action	none	2015
Reducing the potential endangerment from use of plant protection products, for operators and others who can be exposed to spray drift	open	2018
Increasing the use of drift-reducing plant protection equipment	Increase to over 50 % the proportion of equipment, used for arable farming and for vertical crops, that is of a drift-reduction class of 75 % or higher	2023

5.4 Targets: consumer protection (food safety)

The monitoring of residues of plant protection products in foods produced domestically and abroad must be arranged as efficiently as possible.

The amount of exceedings of maximum residue levels must be reduced to below 1 %, in relation to the results of the representative monitoring in all product groups and among all domestic and imported products.

It must be borne in mind that violations are unacceptable per se and must be penalised. The stated target focuses primarily on an improvement of the current situation. It also reflects the fact that exceedings of maximum residue levels cannot be ruled out completely in the future, and that the purpose of monitoring is to reveal such infringements.

Table 6: Targets, target quota and timetable: consumer protection

Target	Target quota	Date
The limit for exceedings of maximum residue levels must be reduced, across all product groups and among all domestic and imported products	< 1 %	2021

5.5 Targets: Environment

5.5.1 Protection of water bodies

Residues of plant protection products and their metabolites are measured in water bodies. The basic goal is to avoid a deposit of plant protection products into water bodies – wherever this is possible.

Pollution of surface water and groundwater, by means of residues of plant protection products and also the decomposition products originating from plant protection products (metabolites), must be prevented as far as is possible or reduced to the degree that

- they comply with the threshold values set in legislative regulations governing groundwater and environmental quality norms for the surface water,
- the protection level for organisms in water bodies, aimed at in the approval of plant protection products, is in fact reached and
- counter-measures are undertaken against every deterioration of the condition of water bodies, e.g. in the case of an increase in the measured concentration of residues of plant protection product in water bodies.

Organic farming contributes to the achievement of the goal by not using chemical-synthetic plant protection products. This applies in particular to herbicides, which are not used in organic farming.

The targets regarding protection of water bodies must be established in accordance with the targets set in the following water-policy legislation - the Water Framework Directive (WFD), the Drinking Water Directive, the Groundwater Directive, and the Environmental Quality Standards Directive (EQSD); they must also be in accordance with national legislation adopted to transpose these directives into national law (cohesion between water protection law and plant protection law). According to the Water Framework Directive, by 2015 a good chemical and ecological status must be achieved for all water bodies, including the groundwater - particularly with reference to priority substances. Non-relevant metabolites of plant protection products

must also be taken into consideration. Here the Drinking Water Commission at the Federal Environment Agency (UBA) has recommended the following orientation value for health purposes: 1.0 µg/l (individual substance) or respectively 3.0 µg/l (total value).

The National Biodiversity Strategy includes the "adaptation of agricultural use in erosion-endangered areas of the meadows and restricted application of fertiliser and plant protection products in the HQ100 area, in order to avoid major disadvantageous effects on the water bodies, by 2015" and "significant reduction of the entries of plant protection products in soils and water bodies by 2015". The National Action Plan is making a contribution to the attainment of these targets (Table 7).

A decision may be made to create buffer zones, permanently covered by vegetation, adjacent to surface waters in sensitive areas identified by hot-spot analyses: a precondition for such a decision is a clear procedure, accepted by all sides, for identifying these sensitive areas (particularly with regard to criteria for designation, demarcation lines of authority, timetables). It is a requirement to take into account the particular conditions prevailing in regions with a high density of water bodies. The economic and social effects of the measures taken, especially in regions with many water bodies, must be ascertained and taken into account. The creation of buffer zones adjacent to water bodies should be designated as a constituent part of agri-environmental programmes. Similarly, Länder should check the extent to which more far-reaching possibilities exist for creating a comprehensive set of buffer zones permanently covered by vegetation. Legislative measures could be brought to bear here, particularly if voluntary measures prove to be insufficient.

Table 7: Targets, target quotas and timetable: protection of water bodies

Target	Target quota	Date
Trend reversal in the case of significant, sustained trends (75 % of the Groundwater Protection Ordinance's (Grundwasserverordnung; GrwV) threshold values)	100 % of the samples	2015
No exceedings of the limit of 0.1 µg/l (single active substance; asset to be protected: drinking water) or respectively 0.5 µg/l (total of all individual active substances; asset to be protected: drinking water) for all active substances in plant protection products and relevant metabolites in the groundwater	100 % of the samples with findings below 0.1 µg/l for new entries	2015
No exceedings of the limit of 0.1 µg/l (single active substance; asset to be protected: drinking water) or respectively 0.5 µg/l (total of all individual active substances; asset to be protected: drinking water) for all active substances in plant protection products and relevant metabolites in surface waters used for obtaining drinking water	100 % of the samples with findings below 0.1 µg/l (single active substance) or respectively 0.5 µg/l (total) for new entries	2015

Target	Target quota	Date
No values exceeding the environmental quality standards (EQS) for priority active substances in plant protection products and relevant metabolites in surface waters, according to the Surface Waters Ordinance (OgewV, Annexes 5 and 7, Tables 1 and 2)	for new entries, 100 % of the samples with findings below EQS levels at the WFD overview measuring centers	2015
For non-relevant metabolites, no infringement of the health-related orientation value	100 % of the samples for new entries	2018
Creation of buffer zones, permanently covered with vegetation and at least 5 m in width, at all surface waters, particularly in protected areas for drinking water, nature reserves and in sensitive areas identified by hot-spot analyses	80 % of the surface waters in sensitive areas	2018
	100 % of the surface waters in sensitive areas	2023
Creation of effective buffer zones for protection of water bodies – permanently covered with vegetation or in agricultural use without the application of plant protection products (this applies solely to farming measures that are classified as being eligible for funding in the context of agri-environmental measures)	100 % of the surface waters in the agricultural landscape	specific to the individual Länder (distant goal)
Reduction of the risk potential from plant protection products for aquatic organisms, calculated by means of SYNOPS risk indices for test organisms	Reduction by 20 % in relation to the base value (average 1996-2005)	2018
	Reduction by 30 % in relation to the base value (average 1996-2005)	2023
Increasing the use of drift-reducing plant protection equipment	Increase to over 50 % the proportion of equipment, used for arable farming and for vertical crops, that is of a drift-reduction class of 75 % or higher	2023
Increase in the use of plant protection equipment (with container sizes ≥ 200 l) fitted with freshwater tanks for cleaning on the field	80 %	2018
	100 %	2023

Target	Target quota	Date
Establishing the level of pollution in small water bodies (standing water bodies and flowing water bodies with catchment area < 10 km) of the agricultural landscape by plant protection products: this is to be done by means of a representative monitoring process and appraisal of the results on the basis of uniform criteria (EQS, regulatory acceptable concentration - RAC)	representative random sample	2018
No infringements of the EQS for priority active substances used in plant protection products and also for relevant metabolites, according to the Surface Waters Ordinance (OgewV, Annexes 5 and 7, Tables 1 and 2), located in small water bodies in the agricultural landscape (standing water bodies and flowing water bodies; catchment area < 10 km ²); or respectively, to the extent that there are no EQS values: no infringements of the maximum tolerable concentration deduced in the approval process (RAC: regulatory acceptable concentration) for active substances in plant protection products and relevant metabolites located in small water bodies in the agricultural landscape. Target quota for EQS according to Surface Waters Ordinance (OgewV): annual average of the measurement values < EQN.	EU-priority substances and specific active substances of plant protection products and relevant metabolites: annual average value of the measurement values < EQN	2015
	maximum values (peak pollution level, result-related monitoring): 99 % of a year's samples produce findings < RAC	2023

5.5.2 Biological diversity

Biological diversity is a central element of the agricultural landscape and of the environment. It makes a crucial contribution to the stability of agricultural and environmental systems. The agricultural policy and evolved framework conditions have significantly greater effects on biological diversity (e.g. via numerous crop-rotation, tillage, planting of ecological focus areas) than plant protection activities do. Thus the Action Plan on Sustainable Use of Plant Protection Products can contribute to the fostering of biological diversity only to a limited degree and in certain sub-areas.

Without certain environmental elements of infrastructure being present (permanent structures such as hedges, untreated sub-areas with wildflowers that occur on arable land, wildflower strips planted for that purpose, etc.), after certain plant protection measures the resettlement of that area for agricultural production is not possible or is only possible after a time lag. Indigenous beneficial organisms can combat harmful organisms directly and thus reduce or eliminate the need for chemical plant protection measures, or even become new candidates for the purpose of biological plant protection. Therefore the challenge is to use suitable measures to conserve and foster the biological diversity of the agricultural landscape, including its indigenous beneficial organisms, and also habitats and places of retreat.

The National Action Plan must provide support to the goals and measures stated in the National Biodiversity Strategy, the National Sustainability Strategy and the sector strategy of the Federal

Ministry of Food, Agriculture and Consumer Protection, aiming at conservation and sustainable use of biological diversity for food, agriculture, forestry and fisheries. The National Action Plan declares its commitment to the goals and measures stated in the strategies mentioned above and aims to make an effective contribution to meeting these superordinate framework requirements that are already in force. Accordingly, plant protection must be arranged in such a way that it contributes to the attainment of the Federal Government's and European Union's goals directed at protection and sustainable use of biological diversity. Plant protection is in fact not the only factor involved here, but it has an influence on biological diversity in agriculture.

Other essential factors to be particularly emphasised with regard to continuous efforts to secure yields and quality, in harmony with the conservation of biodiversity, are the extension of crop rotation in order to broaden diversity within and between species, as well as the plant breeding and the growing of a greater diversity of resistant varieties within the individual crops.

It is not possible to quantify precisely the proportion accounted for by the plant protection measures in relation to achieving the goals stated in the three strategies referred to - the National Biodiversity Strategy, the National Sustainability Strategy, and the sector strategy of the Federal Ministry of Food, Agriculture and Consumer Protection - and aimed at the conservation and sustainable use of biological diversity for food, agriculture, forestry and fisheries; however, the following aspects are particularly significant in relation to plant protection:

- conservation and fostering of diversity of wildflowers in arable fields, by means of adapted farming measures and by means of complete or partial non-use of herbicides in peripheral areas, or in sub-sections of the agricultural areas that produce very low yields; or a complete non-use of herbicides, as applies in organic farming;
- fostering of wildflowers indigenous to arable land, and also of beneficial organisms, non-target arthropods, and of vertebrates living in the wild, as well as of their habitats, by means of drawing up general risk-reduction measures; another approach, consistent with the general principles of integrated plant protection, primarily consists of making available elements of ecological infrastructure in the agricultural landscape, as well as increasing the proportion that such elements account for; this can be brought about, in particular, by such developments being adopted into guidelines for integrated plant protection that are specific to certain crops or to certain sectors of activity.
- Taking a sparing approach to functional and structural biodiversity through increased use of selective plant protection measures.

Table 8 states individual biodiversity-related targets within this National Action Plan.

Table 8: Targets, target quotas and timetable: biological diversity

Target	Target quota	Date
Increase in the proportion of agricultural area on which work is performed on the basis of the Organic Farming Directive (National Sustainability Strategy)	20 % of the agricultural and horticultural area	open

Target	Target quota	Date
Raising the proportion of agricultural and horticultural farms on which work is performed according to acknowledged guidelines of integrated plant protection, specific to certain crops and certain sectors of business	30 % of the agricultural and horticultural farms, 3 years after publication of the respective guidelines	2018
	50 % of the agricultural and horticultural farms, 5 years after publication of the respective guidelines	2023
Reduction of the risk potential from the plant protection products for terrestrial non-target organisms, as calculated by means of SYNOPS risk indices for test organisms	20 % reduction in relation to the base level (average value 1996 to 2005)	2018
	30 % reduction in relation to the base level (average value 1996 to 2005)	2023
Reduction of the pollution impact of plant protection products on pollinating insects	no quantified objective set	open
Raising the proportion of habitats and retreat areas in the agricultural landscape that can contribute to sparing and fostering beneficial organisms and non-target organisms, e.g. by increasing the diversity of wildflowers on arable lands or by creating habitats for retreat (e.g. hedges, areas of fallow land, wildflower strips)	Proportion, depending on the agricultural landscape in question: 3 to 7 % of the landscape area	2018
	Proportion, depending on the agricultural landscape in question: 5 to 10 % of the landscape area	2023
Increasing the utilized agricultural area on which, within the framework of various support programs (agri-environmental programs, contract-based nature protection services, production-integrated compensation measures, fields designated for special protection, etc.), adapted farming measures are carried out (including activities to protect the diversity of wildflowers in the peripheral field area)	specific to each Land	specific to each Land
Creation of ecological focus areas not using plant protection products (coordinated with the resolutions related to the CAP reform)	open	ongoing

Target	Target quota	Date
Reduction in the use of plant protection products and in the risks emerging due to the use of plant protection products in protected areas (national parks, natural monuments, biosphere reserves (core zones and care zones), nature reserves, protected elements of the landscape, biotopes according to Article 30 of the Federal Nature Conservation Act (BNatSchG), Flora-Fauna-Habitat areas, Specially Protected Areas); this can also encompass bans on the use of plant protection products	All relevant protected areas	2018

6. Measures

6.1 Research, practical use and trade

6.1.1 Promoting the initial and further development of measures for risk reduction in plant protection (integrated plant protection and organic farming)

For a range of crops and plant-protection issues, non-chemical plant protection measures are available: these include the use of resistant varieties, preventive measures concerning the technical characteristics of a given crop, or biological, biotechnical and other plant protection measures. Nevertheless, it is urgently necessary to further develop and optimise existing measures and to develop modern integrated plant protection measures. This also includes the initial and further development of modern plant protection equipment and technologies as well as of forecasting models and other decision-making aids, including expert systems. Structures and networks already existing in this area of activity (e.g. ZEPP - the Central Institution for Decision Support Systems in Crop Protection), which is run by the Länder, must be further developed and the cooperation deepened. New plant-protection measures like this only fulfil their purpose if agricultural, forestry and horticultural practice integrates them into existing plant-protection systems. This must be actively supported, e.g. by intensive provision of advice and information, as well as incentive systems. Testing out new or improved measures of integrated plant protection and imparting that knowledge to others, as well as introducing those measures in practice, play an important role and thus have a high priority in the National Action Plan.

Variable instruments are available for this:

a) Programmes of funding

Effective integrated plant protection measures are often not used in practise because the costs exceed the economic benefit of the measures. Within the framework of funding programmes (e.g. agri-environmental measures) the possibility exists to create a certain financial indemnification, thereby providing support to the introduction of guidelines for integrated plant protection or of individual measures, or the introduction of plant protection measures in organic farming.

b) Promotion of innovation

The Ministry of Food, Agriculture and Consumer Protection's programme of promoting innovation offers good opportunities for developing and advancing innovations for integrated plant protection and also for plant protection in organic farming. New technologies enable producers and processors of crops to maintain their competitiveness in global trade and to open up new markets. Similarly, for the home garden and allotment sector and for non-agricultural land, effective and sustainable measures of plant protection should be further developed. Points of emphasis in the programme are innovative measures in plant protection, including stored product protection and plant breeding intended to contribute to limiting the use of plant protection products to the necessary minimum; this is in order to reduce risks that can emerge for humans, animals and the environment.

c) Federal Programme for Organic Farming and Other Forms of Sustainable Agriculture (BÖLN)

The intention of the Federal Programme for Organic Farming and Other Forms of Sustainable Agriculture (BÖLN) is to close gaps in knowledge and experience, both in organic farming and also in other forms of business that are particularly environmentally sustainable, economically viable and socially responsible. In particular, support should be given to projects which are equally suitable for opening up and practically using new measures for integrated plant protection and for organic farming. The focus here is on indirect and preventive plant protection measures as well as non-chemical and biological ones, according to the general principles of integrated plant protection (Annex III of the Sustainable Use Directive).

d) Ministry-specific research (integrated plant protection, breeding research, resistance strategies)

The research specific to the remit of the Federal Ministry of Food, Agriculture and Consumer Protection, and in particular that of the Julius Kühn-Institut (JKI), intensively concerns itself with issues that advance the implementation of the National Action Plan. The Institute's research programmes are being regularly developed further. Aside from intensive research into new integrated plant protection measures for many important crops grown in Germany, the JKI is working on resistance research. Resistant varieties are a core element of integrated plant protection measures. The varieties being grown today are usually resistant to or tolerant of individual biotic or abiotic influences. Resistances based solely on one plant characteristic (often controlled through one gene) can be broken by adapting the harmful organisms. Increasingly, the aim in resistance research is to create modern breeding measures which breed polygenic resistant plants with resistance mechanisms that harmful organisms find it difficult to circumvent.

Functioning and effective resistance strategies are also important in connection with integrated plant protection – here the issue is harmful organisms' resistance to plant protection products. A precondition for such strategies is a coordinated approach between the authorities involved, the scientific community, advisors, and the manufacturers of plant protection products. It is a matter of principle that such resistance strategies are necessary for classes of active substance or respectively for mechanisms of effectiveness that entail a resistance risk, if plant protection measures are being taken against harmful organisms that are subject to frequent selection pressure. Measures used in resistance strategies are intended not solely to prevent the emergence of resistances in practice, but also aim to interrupt early selection processes and to sustainably

guarantee an effective means of combating harmful organisms that are affected. Biological plant protection products can also be affected by this. For these products also, there is thus a need to effect resistance strategies in order to secure these resources over the long term for integrated plant protection and for organic farming.

Measure:

In the context of thematically-overlapping initiatives, **the Federal Government**, by means of the National Research Strategy BioEconomy 2030, is funding basic and applied research that is suitable for providing support to the attainment of the National Action Plan's targets.

Integrated plant protection, resistance research and resistance breeding, as well as strategies for avoiding resistance to plant protection products, form a fixed element in the research programmes of the **Federal Ministry of Food, Agriculture and Consumer Protection** that are specific to the Ministry's remit.

Specifically, within the framework of the programme for funding innovation and also in BÖLN (the Federal Programme for Organic Farming and Other Forms of Sustainable Agriculture), the **Federal Ministry for Food, Agriculture and Consumer Protection** is funding innovative measures both for integrated plant protection and for organic farming: the goal in this is to reduce risks to humans, animals and the environment, arising from the use of plant protection products. Furthermore, integrated plant protection measures and also measures for organic farming continue to be appropriately taken into account in funding programmes.

At present, the **Federal Ministry for Economic Cooperation and Development** is undertaking resistance research in developing countries, via BEAF - the advisors' group for development-oriented agricultural research; BEAF is part of the GIZ German society for international cooperation; further studies on this topic are planned for the future.

The **Länder** provide support to research programmes that particularly assist integrated plant protection and also plant protection in organic farming.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** review their respective research and study programmes regularly and inform one another on developments.

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder** and **relevant associations** provide support to the introduction of innovative integrated plant protection measures into practice, including new resistant varieties. Information, trial programmes, field days and model projects all form part of this. The network of demonstration farms for "integrated plant protection" is being extended with funds from the Federal Government and support from the **Länder**.

Producer associations provide support to the introduction of innovative integrated plant protection measures, as well as to the breeding and market introduction of resistant varieties.

The **Julius Kühn-Institut** conducts topic-specific specialists' discussions and congresses in which current research and study results are reported on and discussed.

6.1.2 Plant protection in organic farming

The advantages of organic farming do not consist solely of the use of less risky plant protection measures; the point is rather that, as a matter of principle, it constitutes a system of farming that presents less risk for all assets that require protection. Because of the non-use of chemical-synthetic plant protection products and the availability of few chemical and biological plant protection products and other alternative measures, preventive plant protection measures assume a particular role in terms of securing yield and quality. However, to attain the ambitious goal of expanding organic farming and enhancing that system's attractiveness for farmers and horticulturalists willing to switch over, practical solutions are absolutely necessary for the problems of plant protection. In organic farming, as elsewhere, "practicable" means that the measures need to be effective, proven and economically viable.

An important measure in broadening the portfolio of non-chemical plant protection products is the fostering of cooperation between research and small to medium-sized enterprises, by the Federal Government and the Länder: the aim here is to develop, demonstrate and disseminate solutions that are biological, environmentally friendly, and use natural substances.

Organic farms require particularly intensive consultation on plant protection matters. Funding instruments held by the Federal Government and the Länder should also be used for this. Of crucial significance here are the complex interactions between the crop-related choice of location and of variety, crop rotation, plant protection, tillage and fertilisation.

Measures aimed at reducing or substituting copper - as a still important chemical plant protection product in organic farming - are allocated special priority. There is an independent strategy on this, being advanced by the associations of organic farms jointly with the associations representing conventional farming. The projects begun at national and European level to produce strategies for reducing and substituting the use of copper are being continued, as are the specialists' discussions for the exchange of information.

Measure:

The **Federal Government**, the **Länder** and **relevant associations** are creating suitable conditions for further developing plant protection measures for organic farming.

Within the framework of BÖLN (the Federal Programme for Organic Farming and Other Forms of Sustainable Agriculture), the **Federal Ministry of Food, Agriculture and Consumer Protection** is fostering plant protection measures in organic farming. The development, demonstration and dissemination of alternative measures for plant protection, particularly biological plant protection, continue to be supported. Plant protection measures used in organic farming continue to be taken into account appropriately in programmes of funding.

Within the framework of agri-environmental programmes and other instruments, the **Länder** are funding the use of effective non-chemical plant protection measures in organic farming.

Professional associations are supporting the development and introduction of biological plant protection measures and also the breeding and market introduction of resistant varieties.

The **Julius Kühn Institute** is organising regular discussions between specialists on important problem areas relating to plant protection in organic farming.

6.1.3 Introduction of new technologies into practice

The further development of integrated plant protection and of plant protection in organic farming, as well as their introduction into actual practice, require considerable dedication of resources, firstly for the provision of information that is appropriate both to the subject matter and to the target group, and secondly for providing supporting advice.

Measure:

The **Federal Government** and the **Länder** are supporting the introduction into practice of new measures of integrated plant protection and of plant protection in organic farming. These efforts are supported by **relevant associations and organisations**.

6.1.4 Maintaining the necessary minimum in using plant protection products

The use of chemical plant protection products must meet the necessary minimum as its point of orientation. Within this, in the use of chemical plant protection products the necessary minimum denotes the amount of plant protection products that is necessary to secure the cultivation of crops, particularly from the aspect of economic viability. A precondition is that all other practicable possibilities for defending against harmful organisms and combating them have been exhausted and also that sufficient consideration has been given to the concerns of consumer protection, environmental protection, and protection of operators.

In agriculture there is a variety of conditions that predominates at any given time, and further events - e.g. with regard to weather and levels of incidence of harmful organisms - often cannot be forecast reliably; this also results in a variety of decisions being taken at the individual-business level and a certain range of usage patterns for plant protection products. In addition, practitioners' decisions regarding necessary plant protection measures are influenced by the individual's level of professional qualification, experience, degree of willingness to take risks, and the quality of advice provided or other accessible expert information. There is also particular significance in the choice of the area to be sprayed, the amount to be used, and the frequency of treatment using a plant protection product. Recommendations regarding reduced quantities to use, compared to approved quantities to use within the framework of the necessary minimum, need to be issued in knowledge of the effective reserves that a plant protection product has and of the risks that resistance to the treatment may emerge. Complying with resistance strategies, as an important principle of integrated plant protection, is thus an absolutely essential element for determining the necessary minimum in plant protection activities. Long-term tests reinforce the reliability of results regarding compliance with the necessary minimum in using plant protection.

Measure:

Based on suitable information, (e.g. annual publication of the results obtained concerning the necessary minimum to use, sourced from the reference farms, as well as data on the use of plant protection products, and further knowledge obtained from reference farms and demonstration farms), the **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are prompting agricultural and horticultural farms to maintain the necessary minimum better than previously and also to avoid unnecessary uses to the greatest degree possible. The **Länder** are supporting this measure through the offers of independent official advice provided by their plant protection services.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and certain **Länder** are providing support to the implementation of long-term studies concerning the necessary minimum of plant protection product to use.

Professional associations and **other relevant associations** are supporting these activities.

6.1.5 Ensuring a sufficient number of plant protection measures

Sustainable plant protection offers a sufficient and diverse range of non-chemical and chemical plant protection measures. As wide a spectrum as possible is important for the choice of the most suitable plant protection measure for the given situation, as well as for targeted resistance strategies. This becomes particularly evident in the case of minor uses and in the context of stored product protection. Here integrated plant protection can often only be practised to a very limited degree, because frequently only one or few plant protection measures are available to solve plant protection problems. In such cases it is not possible to choose the plant protection measure suitable for the situation.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are working together on improving the availability of plant protection measures, particularly for minor uses, stored product protection, and resistance strategies. **Relevant associations** are setting up a joint service institution for minor uses, particularly also in order to coordinate and organise obtaining the data necessary for approval purposes.

As part of this National Action Plan, the **Federal Ministry of Food, Agriculture and Consumer Protection**, jointly with **Länder** and relevant **associations**, is drawing up an "Action Plan for improving the situation in stored product protection", as well as an "Action Plan for plant protection in fruit and vegetable production", based on an analysis of demand in the respective problem areas.

6.1.6 Crop or sector-specific guidelines for integrated plant protection

Guidelines for integrated plant protection specific to crops or to sectors are initiated, further developed and applied on a voluntary basis. Public institutions and/or organisations/associations representing certain professional users of plant protection products can produce corresponding guidelines and they hold responsibility for ensuring that these guidelines are up to date in terms of science and technology. Guidelines specific to crops or to sectors are able not only to support the introduction of integrated plant protection in practice and the provision of advice: they also act as an important foundation for the further development of integrated plant protection, by indicating where suitable methods and measures are not yet available or respectively not yet ready to be put into practice.

The guidelines are quoted in Annex 1 of this National Action Plan if they are recognised to be relevant and appropriate. This recognition is granted after a hearing held with the Scientific Advisory Board by the Federal Ministry of Food, Agriculture and Consumer Protection, in coordination with the **Länder** and also with the following ministries respectively: the Federal Ministry of Economics and Technology, the Federal Ministry of Labour and Social Affairs, and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. The Scientific Advisory Board examines the listed guidelines at irregular intervals to check that they remain up-to-date.

The guidelines must include at least one detailed implementation of the general principles of integrated plant protection for the respective crop or the respective sector. Taking as their basis the eight general principles, the (non-chemical and chemical) methods and plant protection measures currently available and practicable² need to be described.

A guideline must have a motivating effect on the target individuals/groups in order for it to be voluntarily used in practice and for incentives to be made available according to Article 14 of the Sustainable Use Directive. Thus, in particular, it must be formulated in such a way that

1. for the crop or the sector in question, it describes the suitable preventive strategies and (where applicable) also combating strategies, taking as their base the principles of integrated plant protection,
2. the options for action render it possible for users of plant protection products to have the necessary flexibility to adapt to conditions specific to the location, the given farm, and the given situation,
3. possible conflicts of objectives are taken into consideration. These conflicts of objectives can emerge if, for instance, several harmful organisms emerge simultaneously and only one of them can be combated by biological means. Various goals relating to protection also need to be weighed up, e.g. if for soil-protection reasons the soil is tilled without turning it, yet simultaneously there is a proliferation of field mice populations.

The guidelines can be supplemented by more specific guidance for growing the product/s or respectively instructions for use, also taking account of particular regional characteristics. At the same time, the guidance for growing or respectively the instructions for use can act as the foundation for contractual agreements, e.g. in monitored organic farming.

Guidelines can also go beyond the basic requirements stated in the general principles of integrated plant protection, containing additional requirements which are likewise implemented on a voluntary basis. In these cases it should be checked whether the guidelines, or elements of them, can serve as the basis for measures of funding, e.g. within the framework of agri-environmental programmes.

In the event of funding being given for the use of guidelines for integrated plant protection, or of elements of the guidelines, it must be ensured that compliance with the guidelines can be monitored.

Measure:

Professional associations or public institutions (e.g. authorities at Land level, official bodies active in providing advice), are drawing up specific and generally-acceptable guidelines for integrated plant protection with regard to important crops, groups of crops or sectors; where applicable, this involves the participation of relevant associations for consumer, environment, and nature protection.

The **Julius Kühn-Institut** is providing advice to associations and Länder in the process of producing and implementing the guidelines.

² Practicable = economically viable, effective and proven

The **Federal Government**, the **Länder** and **relevant associations** are creating suitable incentives prompting professional users of plant protection products to voluntarily implement guidelines on integrated plant protection that are specific to crops and to sectors.

6.1.7 Development of provisions for use which are applicable to actual practice in the process of approving plant protection products

Protective measures that the operator must take are highly significant in protecting health and the environment. These measures can be issued as a generally-valid stipulation or can be established individually in the approval process, as a requirement or a provision for use, by the Federal Office of Consumer Protection and Food Safety (BVL). It is necessary to make the provisions for use substantially simpler and more comprehensible, in cooperation with experts at Länder level.

Measure:

To make matters simpler and (more) comprehensible, the **Federal Government** and the **Länder** are supporting the development and formulation of provisions for use that are (readily) comprehensible and applicable to actual practice, in the process of approving plant protection products.

Relevant **associations** are endorsing these efforts and contributing to their success.

6.1.8 Preferred use of certain plant protection products or restrictions on their use

Within the framework of the specific measures for protection of the aquatic environment and of drinking water, in accordance with the Sustainable Use Directive it must be ensured that, on a preferential basis, plant protection products are used that are classified as being not dangerous for the aquatic environment and that contain no priority hazardous substances. Substances of particular concern must be described and must be subject to restrictions in their use, according to the Sustainable Use Directive, particularly if the restriction on their use constitutes a suitable instrument for achieving a reduction in the risk for humans, animals or the environment.

Measure:

By 2014, the **Federal authorities** (Federal Office of Consumer Protection and Food Safety (BVL), Julius Kühn-Institut (JKI), Federal Institute for Risk Assessment (BfR), Federal Environment Agency (UBA)) participating in the approval process for plant protection products, will jointly draw up the following:

- criteria for identifying active substances of particular concern according to Article 4, as well as substances hazardous for the aquatic environment or priority hazardous substances, according to Article 11 of the Sustainable Use Directive,
- target quotas specific to active substances; also dates for reduction of the use of plant protection products containing those active substances,
- a concept for effective implementation. The **Länder** are collaborating on this and relevant **associations** are participating.

6.2 Plant protection on non-agricultural land

In Germany, as a matter of principle, the use of plant protection products on non-agricultural land (including municipal areas and railways) is prohibited; it is permissible solely if an ex-

emption is granted. It is the Länder authorities with relevant competence that issue this exemption. Areas owned by Germany's railway company - Deutsche Bahn - are within the competence of the Federal Railway Authority. On a matter of principle, no exemption is issued for the use of plant protection products solely for aesthetic reasons or in drinking-water abstraction areas.

The aim of this regulation is to help to ensure that plant protection products are used solely when this is genuinely necessary, e.g. for safety reasons. It also benefits the protection of water bodies, because hard surfaces give rise to the danger of run-off of substances into the sewerage system and into surface waters. In instances of very permeable foundations of technical, industrial and transport facilities, pollution of the groundwater is possible. Drainage units are particularly sensitive in this regard, if the ground material above them has a low level of retention capacity for plant protection products and water.

As the monitoring activities in plant protection indicate, users do not always sufficiently comply with the general ban on use on non-agricultural land. The reasons include lack of knowledge among user and insufficient advice being provided by distributors.

For the use of plant protection products on non-agricultural land, as elsewhere, it is necessary to comply with the general principles of integrated plant protection. Guidelines for integrated plant protection should be used to help communicate the following: in particular, recommendations concerning alternative possibilities, above all with regard to the use of herbicides; also work on raising awareness among distributors, operators of plant protection products and also the public, concerning the risks involved in using chemical plant protection products in these areas.

Measures:

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are improving the awareness-building activities concerning the general ban on use of plant protection products and also possible exceptional circumstances for the use of plant protection products on non-agricultural land.

The **Länder** are continuing the monitoring activities with regard to non-agricultural land.

Relevant associations and **organisations** are intensifying their provision of advice, raising awareness levels regarding the general ban on use, and supporting the development and introduction of specific guidelines for integrated plant protection on non-agricultural land.

6.3 Plant protection in home gardens and allotments

The provision of information on non-chemical and chemical plant protection measures, directed specifically at the target group, is crucially important for reducing risks in the home garden and allotment sector. For instance, this also includes the on-line provision of guidance on the use of chemical plant protection products and also of comprehensive information on non-chemical plant protection measures. The Länder and many associations have now been directing efforts to this task for many years.

Building on the existing high level, to improve the professional knowledge it is necessary to intensify training activities aimed at providing alternatives to chemical plant protection products, by means of providing further training to advisors, leisure gardeners and distributors of

plant protection products, (JKI, Federal Office of Consumer Protection and Food Safety (BVL), Länder, associations and horticulturalists' academies).

In connection with distributors providing advice and information for home gardeners and allotment users, one point of emphasis must be to effectively divide off areas used for horticultural activities from adjacent non-agricultural land (e.g. footpaths, parking areas, garage entrances), for which a general ban on use of plant protection products applies. The aim is to intensify the provision of advice on non-chemical elimination of unwanted plants and also advice on dealing with plant protection products (cleaning of manually-operated spray units, disposal of residues of spray fluid, products and empty packaging that are old and no longer used).

It is also appropriate to devise guidelines for integrated plant protection based on the general principles of integrated plant protection for the home garden and allotment sector: this can be done by intensifying the cooperation between associations, horticultural academies and research institutions.

There should be a critical review of the plant protection products already approved and of criteria used for approving new plant protection products for the home garden and allotment sector and for non-professional users: this review should be undertaken by the Federal Office of Consumer Protection and Food Safety (BVL), the Julius Kühn-Institut (JKI), the Federal Institute for Risk Assessment (BfR) and the Federal Environment Agency (UBA). The aim of this must be to take the following into account and to communicate it better than before: firstly, new knowledge gained - for the protection of individuals spending time in gardens, particularly also children, old and sick people - and, secondly, the significance of gardens as a reservoir for a multitude of organisms.

Depending on the progress made in disseminating professional knowledge and non-chemical measures, within the framework of the integrated plant protection guidelines in this sector there is a need to examine the option of wholly prohibiting certain plant protection products in this area of use, because (in particular) findings in surface waters point to incorrect use.

Measure:

The Federal Ministry for Food, Agriculture and Consumer Protection, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, and the Länder are raising awareness on plant protection matters, particularly on non-chemical plant protection measures and on use of plant protection products in the home garden and allotment sector.

The option being pursued on a preferential basis is technical solutions for the improvement of protection of users, bystanders and the environment (e.g. non-chemical plant-protection measures, ready-to-use plant protection products, "intelligent" packaging). The criteria for the approval of plant protection products used in home gardens and allotments are being reviewed by the authorities participating in the approval of plant protection products, the aim being to further improve the protection of humans, animals and the environment.

The Federal Ministry of Food, Agriculture and Consumer Protection is collating data on plant protection in the home garden and allotment sector.

Relevant associations and organisations are supporting the improvement of professional knowledge and the development and introduction of specific guidelines for integrated plant protection.

6.4 Avoiding the introduction and spread of harmful organisms

Harmful organisms not present in Germany do not need to be combated in Germany either. Thus the conditions must be maintained, or (where applicable) still be created, for stopping the introduction and spread of harmful organisms as far as is possible, particularly in the case of invasive species.

In view of the far-reaching EU harmonisation of the legislative and, in part, organisational framework conditions, at EU level the improvement of the systems is an absolute prerequisite for optimising precautionary activities in Germany. In reorienting the EU system, an enhancement of efficiency must be achieved. To attain this, it is essential to establish improved and forward-looking monitoring procedures (e.g. to install the necessary infrastructure, such as decontamination units, products used for decontamination, tracker dogs or electronic tools for providing evidence of potential pathogens and for recognising them). In addition, new introductions of such organisms at national level can only be reduced, or respectively kept at the current level, if the staff capacity in this monitoring area (both for conducting the checks themselves and also for providing the expertise to support that process) is maintained at Federal and Länder level. Only in this way can the necessary monitoring level (described in the Compendium on Plant Protection Monitoring in Germany - the National Monitoring Guideline) be ensured.

New introductions of harmful organisms need to be recognised early, by means of suitable diagnostic and monitoring tools. The Julius Kühn-Institut provides support to the Länder by producing prompt risk analyses regarding new harmful organisms and by providing information on plant protection. Measures are absolutely necessary for a central coordination and the use of all material already available. A check should be made on whether to use ISIP information system as a platform.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are collaborating to achieve a reduction of introductions and spread of new harmful organisms and invasive species and thus a reduced overall need to use plant protection products.

6.5 Improving knowledge and information

6.5.1 Ensuring professional knowledge for operators, advisors and distributors of plant protection products; strengthening the provision of advice on plant protection

Sufficient professional knowledge on plant-protection matters is a basic precondition for plant protection products to be used in a proper way and in accordance with regulations, within the framework of integrated plant protection. Naturally, this also applies to plant protection in organic farming. Thus professional users, advisors and distributors of plant protection products must have professional knowledge, in accordance with the Plant Protection Act (PflSchG). Suboptimal performance in plant protection activity, including errors in the use of plant protection products or incorrect protection of operators, often result from an insufficient level of professional knowledge. Therefore there is a need to secure the professional knowledge sustainably among all professional users, advisors and sellers of plant protection products, by means of good initial, additional and further training. Professional users, advisors and distributors are subject to the statutory obligation to take part in a recognised additional or further training activity, at least once every three years.

The provision of advice, awareness-raising, and initial, additional, and further training on plant protection are tasks undertaken by the Länder, according to the Plant Protection Act (PflSchG), Article 59. For this purpose, the Länder make sufficient staff resources available to provide robustly effective and independent official advice. The situation of the public advisory service on plant protection matters in the Länder is regularly documented, as is its significance for achieving the National Action Plan's targets.

Necessary measures of initial, additional and further training, particularly taking into account the topics stated in Annex I of the Sustainable Use Directive, must be carried out regularly and in a target-group-oriented way, even if this demands extra time and resources from all those involved. The measures must also be borne by and given support by the associations representing the relevant bodies of professionals, the scientific community and the practitioners.

Well-founded advice on plant protection matters and on phytomedicine, based on scientific knowledge - also including the warning service - acts as an essential prerequisite for integrated plant protection, for plant protection in organic farming, as well as for the overall attainment of the National Action Plan's goals. The role of the official provision of advice by the Länder is to contribute to effectively conveying the content of regulations; it is also to provide support to the introduction of new integrated plant protection measures, particularly including non-chemical plant protection measures. The issue is one of conveying knowledge regarding the improvement of operators' professional knowledge, as an assignment given by society as a whole.

To implement the National Action Plan, it is imperative to ensure robustly effective and independent official provision of advice on matters of plant protection and phytomedicine. In producing an index of the capacity resources on provision of advice necessary for implementing the National Action Plan, (e.g. with reference to the number of farms or the utilised agricultural area), the Länder take into account already-existing systems of advice, information, and support for decision-making. The index is becoming part of the system of indicators.

Measure:

By means of a robustly effective and independent provision of official advice on plant protection, the **Länder** are providing crucial support to the content of the National Action Plan, and are making sufficient capacity available for this, particularly staff.

The **Länder** are producing an index for the extension capacity necessary to implement the National Action Plan (e.g. related to the number of farms or the utilised agricultural area), providing regular reports.

The **Federal Government** and the **Länder** are drawing up information material and providing support to the development of computer-based decision support systems.

The relevant **associations** are supporting the measures aimed at improving professional knowledge, strengthening the provision of advice on plant protection matters, and also disseminating the National Action Plan's content.

6.5.2 Improving the protection of operators and bystanders

To assess the current status with regard to operators', workers' and bystanders' exposure to plant protection products, a description of the current situation in this regard and an analysis must be drawn up. This analysis is a prerequisite for goals to be deduced at a later stage, as well as measures aimed at reducing the risk potential for human health. For safety at the place of work

and operator safety, it must be investigated what specific additional requirement for action there is. A decision on these measures must be reached at a later stage.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, in coordination with the **Federal Ministry of Labour and Social Affairs**, is commissioning a study that documents existing measures on the topic of safety at work and operator safety, and also of the protection of bystanders; it is also to reveal gaps (where applicable) and suggest measures to take. In particular, this study should conduct a survey among agricultural and horticultural farms, also on the basis of information from the professional associations or relevant trade associations.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder**, also taking into account other relevant authorities at Federal and Länder level, are identifying areas of activity with increased risk levels and associated with the use of plant protection products, and are drawing up measures for improving the situation with regard to the protection of operators and of bystanders.

The **associations** for the relevant bodies of professionals and for the distributors are actively supporting the measures.

6.5.3 Build-up and further development of a comprehensive Internet offering on plant protection matters, also for the general public's use

For the implementation of the National Action Plan, particularly also the further development of integrated plant protection and of plant protection in organic farming, it is of decisive significance that those providing training and also their pupils/students, as well as advisors, distributors and practitioners, have necessary information on plant protection and phytomedicine made available to them from a neutral source.

The existing on-line offerings on plant protection, from the Federal Government, the Länder and universities, as well as from relevant associations, need to be further developed in a target-group-oriented way and maintained at an up-to-date level.

For this, (among other things) measures are necessary to further develop computer-based decision support systems and to offer them in a more strongly target-group-oriented way. The ISIP portal offered by the Länder forms part of this (www.isip.de): this makes avail of many foundation elements that were developed by ZEPP - the Länder-based Central Institution for Decision Support Systems in Crop Protection.

The Julius Kühn-Institut has the statutory assignment to provide information on plant protection. Based on this statutory assignment, there is a need to build up and expand mechanisms for grouping together and passing on knowledge that involved parties have. In this regard, it is a matter of making avail of the technical support from the Federal Office for Agriculture and Food (BLE). The information offerings on plant protection provided by the Länder and by other authorities at Federal level are taken into account.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Federal Office for Agriculture and Food (BLE)**, and also the **Julius Kühn-Institut and the Länder** are supporting or respectively are drawing up and taking care of a set of Internet-based information on plant protection matters: the purpose is firstly to convey information and secondly to convey readily comprehensible information for consumers and for other individuals or groups interested.

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder** and **relevant groups** are formulating information material about the National Action Plan on Sustainable Use of Plant Protection Products, the possibilities and the limits, as well as the benefits and risks of preventive non-chemical and chemical plant-protection measures.

6.5.4 Benefits of plant protection

In devising and reviewing the National Action Plan, according to the Sustainable Use Directive it is required to take into account the health, social, economic and environmental effects of the measures planned. Therefore, alongside the risks for health and the environment that are associated with plant protection, including chemical plant protection, it is also important to take due account of the benefits of plant protection.

Information on the benefits of plant protection as an economic factor can primarily be quantified on the basis of the effects in securing yield and product quality. In addition, at the level of society as a whole, one must consider the benefits of plant protection as an element of the economy (*inter alia*, jobs and tax revenues) and as a component in providing food security, with food and animal feed of high calibre (at national/international level), as well as its role in enhancing the efficiency of area usage.

It is necessary to have comprehensive data sets, analyses and research on the different components of benefits and costs, in order to assess the benefit to the economy and to society as a whole. This also includes assessments of long-term tests and data from reference farms and demonstration farms.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Julius Kühn-Institut** and the **Länder** collaborate in describing the benefits of plant protection, based on robust data, and integrating the results into the information offerings.

The **associations** are providing support to this measure, particularly in terms of supplying data.

6.6 Complying with the plant protection regulations**6.6.1 Plant protection monitoring programme**

The priority goal in monitoring activities in plant protection is to supervise compliance with regulations relevant to plant protection and also to counteract the unlawful import, inadmissible placing on the market, and incorrect use of plant protection products. The intention in doing this is to avert possible hazards for human and animal health and for the environment: such hazards can emerge due to the use of inappropriate plant protection products, a use that is incorrect and not in accordance with the regulations, or through other plant protection measures not corresponding to good professional practice.

The implementation of the monitoring work on plant protection is the responsibility of the Länder. The Federal Office of Consumer Protection and Food Safety (BVL) provides support to the monitoring by making available laboratory capacity for checking samples obtained from distributors and by providing other services. A joint Federal Government-Länder working group - the Working Body on Monitoring of Plant Protection Products - convenes regularly to exchange information and experience gained and also to further develop the programme. Each year, a report is presented on the plant protection monitoring programme, coordinated between the Federal Office of Consumer Protection and Food Safety (BVL) and the Länder.

The plant protection monitoring programme has proved itself; it improves transparency in plant protection matters and makes a major contribution to risk management. As a matter of principle, it is not purposeful to set target values for infringements against the provisions of plant protection law, because in many areas of activity the checks are risk-oriented (i.e. they respond to a real or perceived risk). A high proportion of confirmed infringements typically shows that the checks are targeting the right places, but it does not make it possible to draw direct conclusions about the total number of infringements taking place. However, a high proportion does point to a need for action.

The Internet plays an increasing role in the trade in plant protection products, both nationally and internationally. The checks made by the Länder, supported by the Federal Office of Consumer Protection and Food Safety (BVL), need to be adjusted accordingly.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are continuously further developing the Plant Protection Monitoring Programme. The Internet offerings of plant protection products are being drawn into this work to a greater degree than previously.

Annual reports by the **Federal Office of Consumer Protection and Food Safety (BVL)** are published in the Internet.

6.6.2 Measures against the illegal trade in plant protection products

Plant protection products are made worldwide and the trade in plant protection products is conducted across borders. As a result, plant protection products can get to Germany which are not eligible to be traded here. These are plant protection products that have no approval in Germany or do not correspond to the composition of the approved plant protection product, and also fake plant protection products which are increasingly finding their way onto European markets.

Since 2008, a working group at the Federal Ministry of Food, Agriculture and Consumer Protection has addressed the matter of illegal trade in and illegal use of plant protection products. This working group, comprised of representatives of Federal authorities, Länder authorities with relevant competence, and associations representing distributors and farmers respectively, has formulated a working plan that is continuously being developed.

An important role here is that of informing distributors and users and enhancing their sensitivity to the issues. At consultations and tuition activities also involving Internet trading, the consequences that infringements of the law can have should be pointed out.

To take action against the illegal trade in plant protection products, there has been intensified cooperation between the authorities responsible for plant protection and the police and customs service. Particularly at major entry points, such as ports or airports, there is direct cooperation with the customs service. Special training sessions are conducted with customs officers regarding plant protection products. If there are specific grounds for suspicions with regard to the production of or trade in unauthorised or fake plant protection products, the police are brought into the investigations.

Effectively combating the illegal trade in plant protection products also requires strengthened international cooperation. A start was made in the EU in 2009, with the nomination of national contact centres for the monitoring of plant protection products. This information system needs to be further expanded.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection** is continuing to operate the working group on the illegal trade in plant protection products. The cooperation between customs authorities and the Länder plant protection services is being further improved. Information material is made available to the Länder on a central basis.

The **Federal Ministry of Food, Agriculture and Consumer Protection** is committing its efforts to an improved exchange of information between the EU's Member States and is working in international committees that concern themselves with preventing illegal trade, e.g. at the OECD.

The **Länder** are raising distributors' and operators' level of sensitivity to this issue and informing them of the consequences of illegal imports.

The **relevant associations** are supporting the activities of the Federal Government and the Länder.

6.6.3 Clarity of labelling on plant protection products

Packaging for plant protection products requires a lot of labelling text. Apart from the general information, such as the designation of the plant protection product, the active substance, the owner of the approval and the approval number, this also includes content that is stipulated by the Federal Office of Consumer Protection and Food Safety (BVL) during the approval stage: areas of application, provisions for use, safety notices and information on the proper use of the plant protection product. Plant protection products are also required to be labelled according to the regulations of hazardous-substances law.

The large amount of content on the labelling can easily lead to the user overlooking important regulations for use or not attaching enough significance to them. It is possible to improve levels of compliance with the regulations if the labelling is arranged in a way that is readily comprehensible and clear, and the same structure is used for various manufacturers' plant protection products, or as similar a structure as possible. If so required, relevant legal regulations have to be adapted.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, drawing on the involvement of other **relevant Federal Ministries** as well as **associations**, is formulating proposals for the arrangement of labelling: the goal is to make the labelling of plant protection products clearer than before. If applicable, it should be checked to what extent certain labelling requirements should be derived from this process, to be introduced at EU level or indeed at OECD level.

6.7 Consumer-protection measures (food safety)**6.7.1 Reduction in quantity of exceedings of maximum residue levels**

The prerequisites for deducing measures aimed at reducing the quantity of exceeding of maximum residue levels include the following: the identification of products, groups of products, and countries of origin giving rise to repeated exceeding of maximum residue levels, and also a detailed analysis of the reasons for these violations.

An assessment of the above-mentioned aspects is already undertaken routinely at Länder level: the results flow into an annual plan of sampling activity produced by the Länder; apart from this, a task force on "residues of plant protection products in foods", set up in 2009 by the Federal Office of Consumer Protection and Food Safety (BVL) has the objective of drawing together up-to-date aggregated data from studies sourced from food-monitoring activities and from the business sector more broadly, and analysing them to check for repeated exceeding of maximum residue levels. In this respect, the aim is to investigate possible causes and to develop measures for preventing future infringements. This task force is comprised of representatives of the food monitoring and plant protection services at Länder level and also of relevant sectors of business and their associations.

It should be borne in mind that the data used for the purpose of monitoring compliance with legal regulations is collected on a risk-oriented basis, i.e. samples are obtained to a greater extent in the case of products or countries of origin that have already conspicuously attracted attention. These data are not suitable for investigating the total level of burden that consumers face.

Therefore, within the framework of the nationwide monitoring, data on residues are also collected in a representative way. Since 2009, a revised concept is being applied for monitoring residues of plant protection products. In this, the range of the foods sampled represents more than 90 % of the average expected consumption. To a large degree, the sampling is undertaken within a three-year programme. For foods indicating a low level of health risk potential, based on previous experience, it is not essential to sample them within a three-year cycle. For these foods it is enough to update the data in a six-year period. It should generally be borne in mind that an acting upon the exceeding of maximum residue levels can make itself evident more directly and more quickly in the case of domestically-made products than in the case of products from other EU Member States or, in particular, products from third countries.

Measure:

The **Federal Office of Consumer Protection and Food Safety (BVL)** is continuing the task force on "residues of plant protection products in foods": this is in order to analyse the results, sourced from studies by the Länder and by the business community, to search for repeated instances of exceeding of maximum residue levels, and to formulate possible preventive measures to prevent them.

6.7.2 Prompt presentation of the data on residues

Up to now, the results of the examinations to check for residues of plant protection products, conducted by the food supervision authorities of the Länder, are presented nationwide in summarised form in the "National Report on Residues of Plant Protection Products"; this is produced by the Federal Office of Consumer Protection and Food Safety (BVL) in an annual report, with a time lag of one to two years. Up-to-date results have hitherto only been published at Länder level.

Measure:

Apart from an annual data assessment within the context of the "National Report on Residues of Plant Protection Products in Foods", coordinated with the Länder, every three months the **Federal Office of Consumer Protection and Food Safety (BVL)** is publishing the data provided by the Länder in the form of "quarterly assessments", in order to make the presentation of status more up-to-date with regard to plant protection products in foods.

6.7.3 Multiple residues

Examinations of food for residues of plant protection products frequently reveal residues of several active substances - so-called multiple residues. These can emerge, for instance, if plants are treated using several plant protection products against various harmful organisms - e.g. herbicides against weeds, fungicides against fungi and insecticides against insects. A further reason can be a targeted switch-over to another active substance in order to counteract the development of resistances in the case of pathogens.

For selected groups of substances, cumulative assessments already exist. The European Food Safety Authority (EFSA) has also developed an assessment concept for multiple residues and tested it, taking the example of one group of substances. The result makes clear that it is not yet possible to apply the concept routinely and more research still needs to be done. The EFSA is currently working on a third statement of opinion in which the issue is essentially one of establishing CAGs (Common Assessment Groups - groups of substances to be jointly assessed). Linking into this, a practicable concept needs to be developed for taking multiple residues into account in samples taken for monitoring and supervision purposes. Similarly, there is not yet a concept for taking into account multiple residues when setting maximum residue levels.

Measure:

The **Federal Institute for Risk Assessment** will be intensively involved (with others) in developing practicable concepts over the coming years, concerning how to routinely take multiple residues into account when setting maximum residue levels.

6.8 Measures for the protection of water bodies

6.8.1 Extending the knowledge base and improving the protection of water bodies

As a matter of principle, it is to be assumed that - subject to compliance with all the provisions for use issued by the Federal Office of Consumer Protection and Food Safety (BVL) when approving a plant protection product - possible adverse impacts on water bodies are at a justifiable level. Nevertheless, studies continue to detect residues of plant protection products in water bodies. Usually it cannot be established whether they come from proper uses that are in accordance with the regulations, are attributable to non-compliance with the provisions of use, or come from other sources.

There is a need to further extend the basis of knowledge on protection of water bodies. On this basis, targeted measures must be developed for improving the protection of water bodies against entries of plant protection products. This includes measures aimed at hot-spot management, as well as preventive measures, e.g. the setting-up of sufficient buffer zones adjacent to waters which are un-cropped or on which, at least, there is no use of plant protection products with relevance for protection of water bodies. Likewise, measures aimed at avoiding or reducing spray drift when using plant protection products also contribute to an improvement of the protection of water bodies, as do other technical solutions (e.g. switching off nozzles and boom sections, automatic spray lances with spray-drift-reducing technology, maps for application of plant protection product that incorporate corresponding restrictions).

A further measure is to ascertain the level of pollution in small water bodies in the agricultural landscape.

There is an important measure to take for improving the instrument used for clarifying findings of approved plant protection products at levels exceeding the threshold value set by the Drinking Water Directive (as reported by the Länder water authorities): it is for these cases to be processed as promptly as possible by the Federal Office of Consumer Protection and Food Safety (BVL) and by the plant protection products industry themselves, so that the Länder are able to introduce necessary management tasks quickly. The measures take up a lot of personnel resources, require a tight networking of the plant protection services with the water authorities and demand very effective work from the authorities at operative level.

A permanent working group is in operation at the Federal Ministry of Food, Agriculture and Consumer Protection, involving experts from the competent authorities at Federal and Länder level (including representatives of the water-protection services and of the administration of water companies), as well as other groups of relevant stakeholders; this permanent working group is analysing new knowledge obtained and drawing up suggestions for a targeted and proper improvement to the protection of water bodies against entries of plant protection products.

Measure:

The **Federal Government** and the **Länder** are providing support to the drawing-up and updating of the basis of knowledge on protection of water bodies, with respect to the use of plant protection products, and (where applicable) commissioning studies appropriate to this.

In the context of the Forum, the **Federal Ministry of Food, Agriculture and Consumer Protection** is setting up a working group on "plant protection and protection of water bodies", with the participation of experts from the relevant authorities at Federal and Länder level and also of other groups of relevant stakeholders. The working group is analysing new knowledge obtained and drawing up suggestions for a targeted and appropriate improvement to the protection of water bodies against entries of plant protection products. The **Federal Government** and the **Länder** are examining the working group's proposals and giving support to their implementation.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are supporting the introduction of operational management systems that take into account the plant protection aspects in addition to the aspects of biodiversity and of protection of water bodies. They are also supporting the introduction both of plant protection equipment with fresh-water tanks for the purpose of cleaning equipment in the field and also of spray-drift-reducing equipment.

The **Länder** are examining the possibilities for a harmonisation of existing regulations at Länder level for mandatory minimum distances to surface water bodies, in cases where plant protection products are used, and are taking suitable measures for establishing these harmonised minimum distances. Existing regulations specific to a Land and going beyond any minimum consensus reached among all the Länder, absolutely should be retained.

Relevant associations, institutions and organisations are supporting measures aimed at improving protection of water bodies by means of avoiding entries of plant protection products.

6.8.2 Avoiding entries of plant protection products in surface waters

a) Hot-spot management – water bodies

Fields of activity involving raised levels of risk, defined in terms of time and location (hot-spots), can emerge in connection with plant protection products due to a particular ecological status (among other reasons): these include a dense concentration of water bodies, or very permeable soils.

As these hot-spots cannot always be sufficiently taken into consideration in the context of the nationwide approval of plant protection products, the Plant Protection Law (PflSchG) requires the particular duty of care on the part of the operator: according to the provisions of water law or nature-protection law, it grants the Länder possibilities to establish bans or restrictions on use for plant protection products in protected areas. Aside from the exclusion of protected areas from the use of plant protection products, already-existing buffer zones adjacent to waters should be retained and, where applicable, their extensive (i.e. non-intensive) use should remain possible.

To date it has proved extremely difficult to identify hot-spots according to the principle of precautionary care - the necessary range of instruments has not been available. By now, environmental risk models have been developed for plant protection, also in connection with GIS data. After identifying hot-spots, and against the background of an in-situ analysis (e.g. monitoring), there is a need to draw up and to implement adapted risk-management measures aimed at improving the situation with regard to protection of consumers and of the environment. This can

include regional consultation concepts, as well as special measures aimed at risk reduction in the use of particular plant protection products, or a targeted management of active substances. Within the framework of agri-environmental programmes, support should be given to the creation of buffer zones at all surface waters, permanently covered with vegetation and at least 5 m in width, particularly in protected areas for drinking water, nature reserves and in sensitive areas identified by hot-spot analyses.

b) Avoiding entries from point sources

Entries of plant protection products in surface waters from so-called "point sources" really are a significant issue. In this context, the main sources have been identified as follows: the paths of entry are via farms' draining systems and via run-off from hard surfaces and into the sewerage system, or directly into surface waters. A variety of measures can contribute to the reduction of plant protection products in water bodies.

The following factors are decisive for preventing entries into bodies of water: handling plant protection products in accordance with good professional practice in plant protection when setting up the spray mixture for operation, or respectively when filling the spray equipment; transport to the place of use, without loss; targeted use; avoiding residual amounts; above all, cleaning the spray equipment on the sprayed areas, both internally and externally, also distributing the cleaning fluids there. Getting these sound habits of working behaviour across to practitioners effectively is a high-priority task.

In recent years, progress in the development of plant protection equipment has led to practical technical solutions with regard to simplified and efficient cleaning of equipment, which must be applied consistently in the case of new investments or substitution investments.

c) Reducing the pollution of small water bodies caused by plant protection products

Little is yet known about the actual pollution levels of small water bodies in the agricultural landscape. Thus a monitoring concept should be drawn up in order to be able both to obtain information on the actual status regarding pollution and also to take suitable measures.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety** and the **Länder** are identifying fields of activity with increased risk levels (hot spots), defined in terms of location and time and associated with the use of plant protection products: these organisations are drawing up targeted and adapted measures for improving the situation with regard to protection of water bodies (hot-spot management concepts), also involving other relevant authorities at Federal and Länder level.

The **Julius Kühn-Institut** is supporting the Länder in assessing the structures of land areas. The economic, environmental and social effects of the measures need to be estimated and assessed.

Within the framework of agri-environmental programmes, the Länder are supporting the creation of buffer zones at all surface waters, permanently covered with vegetation and at least 5 m in width, particularly in protected areas for drinking water, nature reserves and in sensitive areas identified by hot-spot analyses.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are supporting management concepts and information offerings aimed at avoiding entries of plant protection products in water bodies, especially entries from point sources. They are supporting the introduction of plant protection equipment with fresh-water tanks for the purpose of equipment-cleaning in the field.

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety** and the **Länder** are drawing up a monitoring concept for determining the pollution status with regard to plant protection products in small water bodies located in the agricultural landscape; they are also implementing this concept.

Relevant associations, institutions and organisations are supporting the drawing up and implementation of management concepts for avoiding entries of plant protection products into water bodies, particularly entries from point sources.

6.9 Maintaining biological diversity

Biodiversity in the agricultural landscape is a particular asset to be protected and is significant for the stability and the functioning of the environment. It is also significant for plant protection because many organisms can act directly as beneficial organisms or indirectly as a basis of nutrition for beneficial organisms. Thus it is also of benefit for plant protection to conserve and to promote biological diversity. Biodiversity as a whole constitutes a target for protection in its own right, according to Regulation (EC) No. 1107/2009. That document makes it a prerequisite for approval that plant protection products are not permitted to have any unacceptable impacts on biological diversity.

Protection of insects, particularly pollinators and other beneficial arthropods, is of major significance in maintaining biodiversity. Measures for protecting honey bees encompass other pollinators of blooms, within the framework of the approval of plant protection products and through the regulations in Germany's Ordinance on the Protection of Bees (Bienenschutzverordnung). These measures must be continued and further developed in order to guarantee a high level of protection.

Unjustifiable effects on biodiversity, arising from the use of plant protection products, must be stopped by targeted and concerted hot-spot management concepts (where applicable), as is the case with protection of water bodies.

Measure:

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety** and the **Länder** are identifying fields of activity with increased levels of risk (hot spots), defined in terms of time and location and associated with the use of plant protection products; they are also drawing up and testing out targeted and adapted measures for improving the situation with regard to biodiversity, particularly in Flora, Fauna and Habitat protected areas as well as in bird sanctuaries (hot-spot management concepts); they are also involving other relevant authorities at Federal and Länder level.

The **Federal Ministry of Food, Agriculture and Consumer Protection** is commissioning a study on the status of arable wild flora in various regions in Germany.

In the context of the Forum, The **Federal Ministry of Food, Agriculture and Consumer Protection** is setting up a working group on "plant protection and biodiversity", with the participation of experts from other authorities at Federal and Länder level and also from other groups of relevant stakeholders. The working group is analysing new knowledge gained and is drawing up proposals for giving targeted and appropriate support to biodiversity in the agricultural landscape, particularly with the goal of sparing and fostering beneficial organisms. The **Federal Government** and the **Länder** are examining the working group's proposals and giving support to their implementation.

The **Federal Government** is broadening the basis of knowledge regarding the connections that link plant protection to the influencing of biodiversity.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are taking into account the measures stated in this section in their formulation of funding measures and funding programmes in plant protection research and also the provision of advice on plant protection matters.

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are ensuring that it is possible to continue over the long term with the monitoring of bee bread, for possible residues of plant protection products. Measures for the protection of honey bees are to be continued and further developed, within the context of approval of plant protection products and through the regulations in the Ordinance on the Protection of Bees (Bienenschutzverordnung).

Associations representing particular professional users, institutions and organisations support these activities or are making their own contributions within the framework of the National Action Plan.

7. Indicators

Progress made with the National Action Plan is reviewed with the help of a comprehensive set of indicators. Here it is important to choose indicators that have a reference to the National Action Plan's targets and that make it possible to review the National Action Plan's degree of achievement of the targets. In addition, data sets are used and further indicators are tracked which are already being used for other purposes. These indicators impart interesting information and are thus also tracked in the context of work on the National Action Plan. However, they do not have a direct and unequivocal point of reference to plant protection. Plant protection is merely one of a whole range of factors that can influence the value of the indicator.

The foundation for the set of indicators is the following concept, proposed by the OECD and refined by the European Environment Agency: "Driving Force – Pressure – State – Impact – Response".

Table 9 states the indicators of the National Action Plan, tied to goals, and also the data sets and the indicators from other areas of activity that are significant for the National Action Plan. The table also names the institutions responsible for the provision of the necessary data and for the annual calculation of the indicators. Within the framework of appropriate boundaries defining areas of competence, the institutions involve other authorities in defining, gathering and calculating the indicators and data sets; they also obtain those authorities' support. For the indicators linked to targets, data-sheets were drawn up with more precise information: these can be

viewed on the National Action Plan website (www.nap-pflanzenschutz.de). For various indicators, the individual Länder serve as the basis for data. Obtaining these data and making them available for calculation purposes could require additional commitment of personnel resources.

Table 9: Indicators and data sets for the National Action Plan

Indicator / size	Brief description	Institution - data	Institution - calculation
(1) Proportion of exceeding of the maximum residue levels (MRL)	This indicator states (in percentage terms) the number of instances of plant protection product residues that exceed maximum residue levels, in all groups of food products which are recorded; the data used are obtained annually on a representative basis from the monitoring activities of the Länder. The assessment period must be adapted to the 6-year cycle of data gathering, in order to fully include all product groups that the monitoring activity encompasses.	Federal Office of Consumer Protection and Food Safety (BVL)	Federal Office of Consumer Protection and Food Safety (BVL)
(2) Plant protection products in surface waters	The pollution of surface waters by plant protection products is recorded by means of assessing the instances that exceed the environmental quality standards (EQS) relating to plant protection products; these standards were introduced with regard to the chemical and ecological status of water bodies as defined in the Water Framework Directive; note that when abstracting drinking water, the drinking-water threshold value is also assessed.	Länder	Federal Environment Agency (UBA)
(3) Proportion of water bodies with buffer zones permanently covered in vegetation, located at surface waters in the agricultural landscape.	Based on the data from the Integrated Administrative and Control System (InVeKos), a calculation is made determining the proportions of water bodies (according to width classes) which have a buffer zone at least five meters in width.	JKI / Länder	JKI
(4) Residues of plant protection products in small water bodies	Compilation of the measurement results obtained from small water bodies.	Länder	JKI / Federal Environment Agency (UBA)

Indicator / size	Brief description	Institution - data	Institution - calculation
(5) Plant protection products in the groundwater	The pollution of the groundwater by means of plant protection products is presented by assessing the instances of exceeding of the threshold value for groundwater, namely 0.1 µg/l.	Länder	Federal Environment Agency (UBA)
(6) SYNOPS - risk index for aquatic non-target organisms. (7) SYNOPS - risk index for terrestrial non-target organisms.	SYNOPS calculates a generic risk index for aquatic organisms (surface water) and also for terrestrial organisms (soil and ecological infrastructures). It provides for a linking-up of the data on the use of plant protection products with environment-relevant data (conditions of use) and with the inherent characteristics of the substances, as well as with the information on toxicity with respect to aquatic and terrestrial test organisms. The exposure levels are calculated by means of sub-models for the paths of entry - spray drift, run-off and drainage.	Federal Office of Consumer Protection and Food Safety (BVL) / JKI	JKI/Federal Environment Agency (UBA)
(8) Quantity of confirmed instances of poisoning among bees	This indicator shows the confirmed cases of poisoning but not the total number of cases of poisoning.	Examination unit for cases of bee poisoning (JKI)	Examination unit for cases of bee poisoning (JKI)
(9) Monitoring of bee bread	Residues of plant protection products in bee bread.	Bee monitoring / JKI	JKI/Federal Office for Agriculture and Food (BLE)
(10) Proportion of compliance with the necessary minimum	This indicator shows to what extent the users of plant protection products are approaching the necessary minimum that is set dependent on the annual status in terms of infestation.	JKI / Länder	JKI/Federal Office for Agriculture and Food (BLE)
(11) Proportion of area/quantity of farms engaging in organic farming	This states the proportion that areas farmed organically account for in relation to the total area used for agriculture; also given is the quantity of organic farms as a proportion of the total quantity of farms.	JKI	JKI/Federal Office for Agriculture and Food (BLE)

Indicator / size	Brief description	Institution - data	Institution - calculation
(12) Proportion of farms that are farming according to crop or sector-specific guidelines of integrated plant protection.	This indicator describes the proportion of farms producing according to the crop or sector-specific guidelines of integrated plant protection.	Associations/Federal Office for Agriculture and Food (BLE)	JKI/Federal Office for Agriculture and Food (BLE)
(13) Status Report - Biological Plant Protection	Indicates, at five-year intervals, the extent to which biological plant protection measures are being used.	JKI / Länder	JKI
(14) Proportion of established infringements of plant protection law	This indicator states the areas in which checks have established infringements (% of infringements).	Länder	Federal Office of Consumer Protection and Food Safety (BVL)
(15) Availability of plant protection products	This indicator states the availability of plant protection products with various functioning mechanisms.	Federal Office of Consumer Protection and Food Safety (BVL)	Federal Office of Consumer Protection and Food Safety (BVL)
(16) Plant protection equipment	Number of types of plant protection equipment that are listed as having "loss-reducing" properties or "saving of plant protection products"	JKI	JKI
(17) Domestic sales of active substances of plant protection products / domestic sales of active substances causing particular concern	States the overall total of active substances sold in Germany and, in particular, of the active substances classified as belonging to the class "causing particular concern".	Federal Office of Consumer Protection and Food Safety (BVL)	Federal Office of Consumer Protection and Food Safety (BVL)

Indicator / size	Brief description	Institution - data	Institution - calculation
(18) Funding situation - organic farming	This indicator annually documents the funds deployed by the Federal Government and by the Länder (total and subdivided according to the individual Land), for farms' conversion to and also continuation of organic farming (according to the Council Regulation (EC) No 834/2007 on organic production and labelling).	Federal Office for Agriculture and Food (BLE) / Fed. Min. of Food, Agric. and Consumer Protection (BMELV)	Federal Office for Agriculture and Food (BLE)/ BMELV
(19) Situation of official consultation service provided by the Länder	This indicator annually documents the offering of consultation services by the Länder (total and sub-divided by Land, e.g. expressed as an "advisors' index").	Länder	BMELV
(20) Securing the yield by means of plant protection	Retrospectively describes the annual securing of the yields of important crops by means of plant protection products, stating the difference in yield between the untreated alternative and an alternative given plant protection that is adapted to the region and to the extent of infestation (either in relative terms as a % or in absolute terms in decitonnes/hectare - dt/ha).	JKI	JKI
(21) Area efficiency	The "area efficiency" indicator is defined as cultivated area per tonne of the crop yielded in the harvest. The results of the "special calculation of the harvest and quality" serve as the data set for this. In mathematical terms this is the reciprocal value of the yield per hectare. This indicator is used to check that the risk-reducing measures are not triggering a trend that is working against the objective of increasing the area efficiency.	Federal Statistics Office/ Federal Office for Agriculture and Food (BLE)	JKI
(22) High Nature Value Farmland Indicator	This indicator is already obtained as a so-called obligatory indicator in accordance with Council Regulation (EC) No 1698/2005 (EAFRD Regulation).	German Federal Nature Conservation Agency (BfN)	German Federal Nature Conservation Agency (BfN)

Indicator / size	Brief description	Institution - data	Institution - calculation
(23) SPEAR Index (plant protection products)	The SPEAR Indicator takes as its basis the biological characteristics of organisms. The SPEAR Indicator supplements existing biological methods of assessment and indicators with regard to estimating the environmental effects that plant-protection activity has.	Federal Environment Agency (UBA)	Federal Environment Agency (UBA)
(24) Sustainability indicator for the diversity of species (trends in the populations of selected species of birds in agricultural landscapes)	<p>The sustainability indicator for the diversity of species provides information on the condition of selected species of birds in the agricultural landscape and changes in their population levels, reflecting the reaction of these species to different pollution factors and thus also the quality of the agricultural landscape as a habitat.</p> <p>This indicator is already obtained in the context of the Federal Government's Sustainability Strategy and the implementation of the EAFRD Regulation.</p>	German Federal Nature Conservation Agency (BfN); DDA (German ornithologists' association)	German Federal Nature Conservation Agency (BfN); DDA (German ornithologists' association)
(25) Extent of infestation	Retrospectively describes the annual level of infestation of important crops/sectors by typical harmful organisms or groups of harmful organisms.	JKI / Länder	JKI
(26) Agricultural area	Indicates the area used for agriculture, divided into arable land, grassland, special crops, and set-aside areas.	Federal Statistics Office	Federal Statistics Office
(27) Domestic issue of active substances	States the total quantity of active substances, divided according to their areas of operation and chemical classes, sold in professional and non-professional (home gardens and allotments) areas of application in one year in Germany. There is a separate itemization of biological-based plant protection products and also of active substances constituting sources of particular concern, according to Article 4 of the Sustainable Use Directive.	Federal Office of Consumer Protection and Food Safety (BVL)	Federal Office of Consumer Protection and Food Safety (BVL)

Indicator / size	Brief description	Institution - data	Institution - calculation
(28) Treatment index	The treatment index is used as a tool in describing the status quo in terms of the intensity of treatment applied to the respective crop in the year for which data are collected. The data are obtained from the network of reference farms and the farming sector's Industry Panel for Regulation (EC) No 1185/2009 on statistics.	JKI	JKI

7.1 The German Plant Protection Index – PIX

The framework of a German Plant Protection Index (PIX) makes provision for clearly presenting the periodic results of the indicator system in a readily comprehensible way. What this involves is a compressed overview of the individual results, but not however an aggregation of the results to form an overall measurement figure. The role of the PIX is to make it possible to inform the public at large, quickly and comprehensively.

In essence, the PIX presents the results of the indicators. In this context, the indicators that are tied to targets are characterised both by a base value, describing the initial value at the start of the Action Plan³, and also by a target value stating the value being aimed for after a certain time period passes.

Therefore, apart from the current status quo for the sub-indicator, the PIX also always states the degree of achievement of the target. This degree of achievement is stated as a percentage. A 100 % level of achievement means that the goal was fully reached within the period under consideration.

In order to describe the indicators tied to targets, indicator data-sheets were drawn up: these can be viewed on the National Action Plan's website (www.nap-pflanzenschutz.de).

8. Reporting and evaluating the results

It is the Federal Government that reports on and evaluates the National Action Plan. The Länder are actively involved and the groups of relevant stakeholders participate.

Each year, the Federal Office for Agriculture and Food (BLE) produces the presented material about the PIX, based on the evaluations of the indicators, publishing them on the National Action Plan's website. The Forum on the National Action Plan is regularly informed on this.

The Federal Office for Agriculture and Food (BLE), coordinating with the Julius Kühn-Institut (JKI), the Federal Office of Consumer Protection and Food Safety (BVL), the Federal Institute for Risk Assessment (BfR) and the Federal Environment Agency (UBA), and also with the Länder, produces a draft for a report on the National Action Plan for the preceding four years,

³ If such a base value is not available, e.g. because no measurements were taken in the past, a worst-case value is taken as the basis for measurement.

based on the targets, measures and indicators described. The first Intermediate Report will thus become due on 30 June 2017 for the years 2013 to 2016. Aside from presenting and analysing the current status, the purpose of this draft is also to contain proposals for more far-reaching steps or adaptations of the National Action Plan. It is thus the foundation for the review of the National Action Plan that is necessary after five years.

The draft of the Report is submitted to the Forum on the National Action Plan on Sustainable Use of Plant Protection Products. The Forum discusses the report, proposing changes or additions, where applicable.

Information produced in accordance with Article 15 (2) of the Sustainable Use Directive is submitted to the European Commission.

Apart from the five-year report, current developments in the implementation of the National Action Plan, in particular the status on individual indicators for the measurement of progress in achieving the targets, are published promptly on the National Action Plan's website and updated at regular intervals. The Forum on the National Action Plan is also regularly informed on this.

9. Accompanying support and flanking measures

9.1 Accompanying support to and coordination of the National Action Plan on Sustainable Use of Plant Protection Products

The Federal Office for Agriculture and Food (BLE) provides support to the work on the National Action Plan on Sustainable Use of Plant Protection Products. In particular, it has the following tasks:

- technical implementation and maintenance of the National Action Plan's website (the Julius Kühn-Institut takes care of the scientific content),
- technical and organisational preparation and follow-up for the Forum on the National Action Plan on Sustainable Use of Plant Protection Products, including the working groups on protection of water bodies and on biodiversity,
- preparing and conducting specialists' discussions, as well as workshops,
- running the German Plant Protection Index (PIX),
- reporting on the National Action Plan,
- producing and providing information material (e.g. brochures, flyers, etc.),
- office hosting the Scientific Advisory Board.

9.2 Scientific support to the National Action Plan on Sustainable Use of Plant Protection Products

The Julius Kühn-Institut provides support to the National Action Plan in terms of its scientific aspects - in particular, has the following tasks:

- organising and assessing data collected on the use of plant protection products,
- calculating and further developing the National Action Plan's indicators,
- studies to determine the necessary minimum to apply when using plant protection products,
- further development of the general principles of integrated plant protection and support to the associations in developing guidelines on integrated plant protection specific to crops and to sectors,
- taking care of the reference farms and demonstration farms in terms of scientific matters,
- preparing and conducting specialists' discussions and workshops.

9.3 Scientific Advisory Board of the National Action Plan on Sustainable Use of Plant Protection Products

The Federal Ministry of Food, Agriculture and Consumer Protection convenes a Scientific Advisory Board on the National Action Plan. In particular, the Advisory Board has the following tasks:

- producing specialist reports on the structuring of programmes of research, innovation and funding;
- producing specialist reports on individual measures taken as part of the National Action Plan;
- assessment of guidelines on integrated plant protection specific to crops and to sectors, with regard to those guidelines' relevance and appropriation;
- drawing up proposals for the further development of the National Action Plan.

9.4 Forum on the National Action Plan for Sustainable Use of Plant Protection Products

The management of the Forum is part of the remit of the Federal Ministry of Food, Agriculture and Consumer Protection; it is supported in this assignment by the Federal Office for Agriculture and Food (BLE) and the Julius Kühn-Institut. Those invited to the Forum are representatives of the Federal Ministries and Federal Higher Authorities involved, of the Länder, and also of the federal associations and organisations in the following activity areas:

- consumer protection,
- environment protection and nature conservation,
- water management and protection of water bodies,
- agriculture, horticulture and forestry incl. contracted services,

- organic farming,
- the food-processing industry,
- manufacturers of plant protection products and of plant-protection equipment,
- traders of food, feed and plant protection products,
- associations representing non-agricultural users of plant protection products (e.g. home gardens and allotments, railways, cities, towns and municipalities, including the conference of heads of the official service for garden-related matters),
- plant-protection research.

The Forum reviews the progress made by the National Action Plan. Its remit is to draw up proposals for the further development of the National Action Plan. The Forum convenes at least once per year at the invitation of the Federal Ministry of Food, Agriculture and Consumer Protection.

9.5 The associations' self-imposed obligations and contributions

The principle is that the associations relevant to the National Action Plan on Sustainable Use of Plant Protection Products participate in the National Action Plan on the basis of self-imposed obligations or their own contributions. It is to be permissible for organisations to use suitable contributions made to the National Action Plan in their own publicity activities. The associations' self-imposed obligations and contributions are stated in Annex 2 of the National Action Plan.

9.6 Involvement of the environment protection and nature protection associations and also of the water industry

Environmental protection associations and nature conservation associations are not affected directly by the implementation of the programme, yet the objective and the content of the National Action Plan on Sustainable Use of Plant-Protection Products are in accord with a range of demands advanced by these associations. Therefore, flanking support of the National Action Plan, e.g. by appropriate publicity work, is highly significant for the success and the credibility of the National Action Plan and its measures.

9.7 Resources for implementation of the National Action Plan

The implementation of the measures requires additional efforts from everyone involved. The success of the National Action Plan on Sustainable Use of Plant Protection Products depends to a large degree on how and to what extent

- one can convey to practitioners the possibilities of improving compliance with the requirements regarding the necessary minimum of plant protection products to use,
- access to specialist information and decision support systems are improved,
- financial resources are made available to support research into non-chemical and improved chemical measures,
- financial resources are made available for relevant funding programmes at Federal and Länder level.

In particular, available resources and (where applicable) additional funds are to be committed to the following measures, based on new priorities being set:

a) at **Federal level** for

- coordination and provision of support to the National Action Plan by the Federal Office of Agriculture and Food (BLE) and the Julius Kühn-Institut,
- providing support to the data-gathering activities on the use of plant protection products,
- calculating risk indices and determining risk trends, as well as further developing risk indicators in plant protection,
- maintaining the German Plant Protection Index (PIX),
- the network of reference farms,
- the demonstration farms,
- specifically formulating the process for identifying hot spots,
- building up and maintaining the provision of a comprehensive Internet offering on plant-protection matters,
- the Scientific Advisory Board.

b) at **Land level** for

- securing the measures required to implement the new regulations on professional knowledge,
- extending the information and extension services on offer,
- intensifying the testing activities and the monitoring of pathogens,
- gathering and assessing the data from reference farms,
- clarifying the reasons for hot spots and managing the necessary minimum,
- preventing the introduction and spread of harmful organisms,
- extending and deepening the checks,
- developing integrated production systems and new technologies, including their implementation in practice.

In addition, financial resources are essential at Federal and Länder level for

- strengthened introduction of innovations and elements of integrated plant protection and also of plant protection in organic farming,

- strengthening research and development,
- funding instruments that contribute to the National Action Plan.

For financing, the Federal Government and the Länder respectively have different possibilities at their disposal. The principle is that the financing needs to be in accordance with the respective funding organisation's remit.

10. Summary

Plant protection is necessary to protect our plants, particularly crops, against disease, pests and non-parasitic influences. It makes its value and benefit evident for agriculture and forestry, as well as for horticulture, particularly by reducing harvest losses and securing the quality of crops. Plant protection also provides a far from insubstantial benefit to society as a whole. It contributes to securing farms' incomes in agriculture, forestry and horticulture, and thus also to the securing of employment in rural areas. It is an important factor in enhancing the efficiency of the resources deployed (such as labour, seed, energy, fertiliser, water) for crop production on open land, as well as in securing the harmlessness of these products in terms of health.

In Germany, the implementation of plant protection and, in particular, the approval and use of plant protection products, are regulated on the basis of EU law; this is done comprehensively and at a high level of protection for humans, animals and the environment, including surface water and ground water. Regulations on other areas of law, such as law relating to water, nature protection, chemicals, hazardous substances, genetic engineering, transport or food, also refer to plant protection issues and to dealing with plant protection products.

Nevertheless, all European Union Member States ascertain to a varying degree that despite all legislative regulations, plant protection products are still to be found in water bodies; bees and vertebrates are harmed; and foods reveal exceedings of maximum residue levels for active substances used in plant protection products. The reduction in biological diversity that still persists in our agricultural landscape is also influenced by plant protection measures, among many other factors.

These facts have prompted European Union legislators to issue a requirement to all Member States to draw up a National Action Plan on Sustainable Use of Plant Protection Products, to implement it consistently and, where applicable, to develop it further, as an addition to the legislative regulations: this requirement is in Article 4 of Directive 2009/128/EC of the European Parliament and the Council establishing a framework for Community action to achieve the sustainable use of pesticides (Sustainable Use Directive). The National Action Plan opts for a voluntary implementation of the measures and strives to create incentives. It is a deliberate decision not to introduce regulatory measures that go beyond the laws currently in force.

In a targeted way, the Action Plan directs efforts towards reducing the risks and adverse impacts for human health and the environment, associated with plant protection products. Integrated plant protection and organic farming take the central role in this. These approaches strive to use preventive and non-chemical measures and – if necessary – employ plant protection products in a targeted, appropriate way, in accordance with the regulations. Within this, preference should go to low-risk plant protection products.

The National Action Plan deliberately does not opt for across-the-board reductions of quantities. Across-the-board reductions of quantities of plant protection products sold overlook the characteristics of the substances and the risks associated with their use. The reduction of risk is also the background to the Sustainable Use Directive's requirement restricting the use of certain active substances of particular concern.

By taking into account the health, social, economic and environmental effects of the measures planned in compiling and reviewing the National Action Plan, the aim is to do justice to the goal of sustainability.

The National Action Plan is essentially structured as follows:

1. Starting point
2. Goals
3. Measures
4. Indicators
5. Reporting and accompanying measures.

1. Starting point

Through Articles 4 and 5 of the Plant Protection Act (PflSchG) of 6 February 2012, Article 4 of the Sustainable Use Directive is transposed into national law. The stipulation is that the Federal Government must draw up a National Action Plan on Sustainable Use of Plant Protection Products; this is done with the cooperation of the Länder and the participation of the relevant groups of stakeholders (in particular, associations for consumer protection, environment protection and nature conservation, and for protection of water bodies; also agricultural associations and associations of plant protection products' manufacturers and distributors); with the Plan's help, the aim is to reduce the risks and adverse impacts from the use of plant protection products, for consumers, operators and the environment. Taking into account risk-reducing measures already taken, the National Action Plan is required to contain quantitative regulations, targets, measures and timetables for reducing the risks and adverse impacts of plant protection products on the human and animal health, as well as on the environment.

The National Action Plan draws on experience gained with the National Action Plan that was coordinated in 2008 by the Federal Ministry of Food, Agriculture and Consumer Protection with the Agriculture Ministers of the Länder. Apart from agriculture, forestry and horticulture, the National Action Plan also encompasses questions relating to the use of plant protection products in non-agricultural areas (e.g. municipal applications, sports grounds, areas designated for the public, such as parks or playgrounds, railways, industrial facilities) and also in home gardens and allotments.

The starting point or situation at the outset is described for agriculture, horticulture and forestry, protection of operators, consumer protection and protection of the environment, among other topics.

2. Targets

The target requirements relate to plant protection, operator protection, consumer protection and protection of the environment. The Action Plan is pursuing global goals. Subordinated to these global goals are particular sub-goals, some of which are also more readily describable in quantitative terms and are given timetables.

The global goals of the National Action Plan are:

- to further reduce the risks and adverse impacts associated with plant protection products for human health and the environment. This means the following:
 - = there must be a 30 % reduction in the risks that using plant protection products entails for the environment (base: average value for 1996 – 2005),
 - = exceedings of the maximum residue levels must be reduced to below 1 % by 2021 in all product groups for both domestically-produced and imported foods,
 - = the adverse effects of using chemical plant protection products must be further reduced for operators, workers, bystanders and residents.
- There is a requirement to foster the introduction and further development of plant protection measures in limited-scale applications of plant protection products and in integrated plant protection. This includes further extending the proportion of practicable non-chemical measures used in the integrated and organic plant-protection concepts, e.g. using biological, biotechnical or mechanical plant protection procedures, and also securing sufficient availability of active substances used in plant protection products for efficient resistance strategies.
- The use of plant protection products must be reduced to no more than the necessary minimum.
- Further improvements must be made to safety in dealing with plant protection products.
- There needs to be an improvement in the provision of well-balanced information to the public, concerning the benefits and risks of plant protection and, in particular, the use of chemical plant protection products.

3. Measures

Suitable measures are being implemented for the purpose of achieving the targets of the Action Plan. The Federal Government and the Länder are each making resources available according to respective areas of competence. Relevant associations and organisations are providing support to many measures and making independent contributions to the attainment of the goal. The following are examples of such measures:

Research on integrated plant protection and on plant protection in organic farming

- Funding of research and innovations in plant protection, as well as the further development of measures of integrated plant protection and of plant protection in organic farming: this is how the Federal Government intends, within the framework of initiatives that overlap the-

matically with the National Research Strategy BioEconomy 2030, to foster basic and applied research suitable for supporting the achievement of the National Action Plan's targets.

- Guidelines for integrated plant protection are developed by public bodies or organisations that represent certain professional users of plant protection products. Relevant and appropriate guidelines are adopted into the Action Plan.
- The Federal Government, the Länder and relevant associations create suitable incentives to prompt the professional users of plant protection products to voluntarily implement guidelines for integrated plant protection that are specific to crops or to sectors.

Official consultation provided by the Länder on plant-protection matters

- By means of robustly effective and independent official extension on plant-protection matters, the Länder are providing crucial support to the content of the National Action Plan and are making sufficient capacity available, particularly staff.
- The Länder are producing an index for the advisory capacity that is necessary for implementing the National Action Plan and are reporting regularly.

Protection of water bodies and biodiversity

- The Federal Ministry of Food, Agriculture and Consumer Protection, the Federal Ministry of the Environment, Nature Protection and Reactor Safety, and the Länder are drawing up and implementing a monitoring concept: the aim of the concept is to determine the pollution status with regard to plant protection products located in small water bodies in the agricultural landscape.
- Within the framework of agri-environmental programmes, the Länder are supporting the creation of buffer zones at all surface waters, permanently covered with vegetation and at least 5 m in width, particularly in protected areas for drinking water, nature reserves and sensitive areas identified by hot-spot analyses.
- The Federal Government and the Länder are supporting the introduction of operational management systems that take into account the plant protection aspects as well as the aspects of biodiversity and protection of water bodies.
- The Federal Government and the Länder are identifying fields of activity with increased levels of risk, defined in terms of location and time and associated with the use of plant protection products; they are also drawing up and testing out targeted and adapted measures for improving the situation with regard to protection of water bodies and biodiversity, particularly in flora, fauna and habitat areas as well as bird sanctuaries.

4. Indicators

The achievement of the National Action Plan's targets is reviewed by means of a set of indicators and data. In this context, indicators have been chosen that have a reference to the targets of the National Action Plan and that make it possible to review the degree of achievement of the goal and hence the success of the measures in the National Action Plan. These include:

Plant protection

- Situation of the official advisory service on plant protection matters in the Länder (i.e. the advisors' index).
- Proportion of farms that are farming according to guidelines of integrated plant protection that are crop-specific or sector-specific.
- Availability of plant protection products.
- Proportion of the agricultural area / proportion of the number of farms devoted to organic farming.
- Area efficiency and security of yield.

Consumer protection

- Proportion of total values accounted for by exceedings of maximum residue levels.

Environment

- Relative risk potential for the environment as compared to the base value (average of the years 1996 to 2005 = 100 %).
- Proportion of water bodies with buffer zones permanently covered with vegetation, at surface waters in the agricultural landscape.

Accompanying this, there is also a tracking of indicators already used in other areas of activity: these include the sustainability indicator for diversity of species (trends in the populations of selected bird species in agricultural landscapes). Important data sources are data on sales and use of plant protection products, as well as data from the Status Report on Biological Plant Protection.

5. Reporting and accompanying measures

It is the Federal Government that reports on and evaluates the National Action Plan. The Länder are actively involved and the groups of relevant stakeholders participate. The Forum on the National Action Plan (Federal and Länder authorities, all relevant and participating associations) is informed on progress once per year and it draws up proposals for further development. The results are also presented regularly on the National Action Plan's website (www.nap-pflanzenschutz.de). A written report on the preceding four years is produced at five-year intervals. The first draft will thus become due on 30 June 2017 for the years 2013 to 2016. A Scientific Advisory Board is being set up. Associations and organisations can contribute to the attainment of the National Action Plan's targets by means of self-imposed obligations and contributions.

Annex 1
Guidelines on integrated plant protection specific to crops or to sectors

Number	Association/Author	Title	Entry into force	Remarks

**Annex 2:
Self-commitments or contributions to the National Action Plan by relevant
associations**