



Federal Ministry
of Food, Agriculture and
Consumer Protection

National Action Plan on Sustainable Use of Plant Protection Products

Risk mitigation in Plant Protection
Less Risk – more confidence





Foreword



Plant protection products are used to protect plants and plant products from harmful organisms and abiotic damage. They are indispensable in the production of high quality plant-based foods. Given the world's growing population, food production must rise significantly in the coming years despite the fact that there are limits to the amount of arable and grazing land available. This calls for careful management and conservation of natural and near-natural ecosystems. Optimised production in existing fields and pastures thus remains a key agricultural policy strategy.

Plant protection products are among the most widely researched chemical substances. The main priority is to ensure that their use poses no threat to humans, animals or the natural environment. Plant protection products must have a reliable effect while any potential risk arising from their use must remain at an acceptable level. So when working towards optimised production and greater risk reduction, it is now more important than ever to take in the findings of biological research, make use of technological advancement, foster innovation and enhance existing methods for integrated plant protection so as to reduce the quantities of plant protection products used while boosting their effectiveness.

Germany's Plant Protection Product Reduction Programme (Reduktionsprogramm chemischer

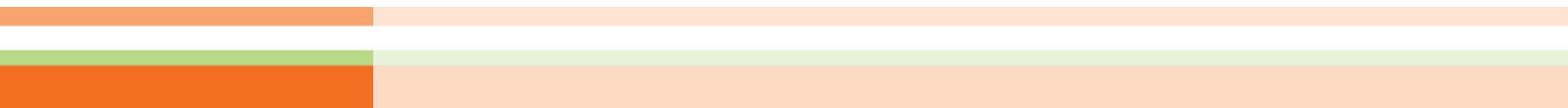
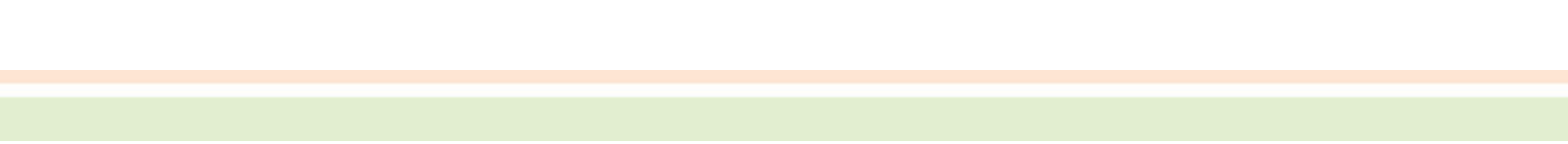
Pflanzenschutz) was a key step in the right direction. This National Action Plan on Sustainable Use of Plant Protection Products broadens this approach by setting a target to reduce the risks arising from the use of plant protection products by another 25 percent by 2020 and has already been approved by the Conference of German Agriculture Ministers. Federal and Länder-level agencies, the affected agricultural and horticultural associations, and consumer protection, environmental protection and nature conservation organisations are now called upon to work together in implementing the National Action Plan and achieving its target.

Through the voluntary inclusion of requirements with which all EU Member States will be required to comply in the coming years, the National Action Plan prepares Germany to deal with future developments in Europe.

I should like to thank everyone involved in putting this Action Plan together and look forward to achieving progress in sustainable use of plant protection products.

A handwritten signature in green ink that reads "Ilse Aigner". The signature is fluid and cursive.

Ilse Aigner
Federal Minister for Food, Agriculture
and Consumer Protection



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1. Introduction

In Germany, the implementation of plant protection measures and especially the registration, approval and use of plant protection products has a broad legal basis and is regulated to provide a high degree of protection for humans, animals, ground-water and the natural environment. Basic guidelines have been published on good plant protection practice (Bundesanzeiger/Federal Gazette, 57 and 58a, 2005). Good plant protection practice includes giving consideration to the principles of integrated plant protection (Section 2a of the German Plant Protection Act (PflSchG), 1998; Bundesgesetzblatt I pp. 971, 1527, 3512).

Comprehensive plant protection legislation has among other things been enacted to protect crops from harmful organisms and to prevent the risks that plant protection product use or other plant protection activities may pose to humans, animals and the natural environment.

Following broad dialogue on plant protection policy in Germany, the Plant Protection Product Reduction Programme was devised and published in 2004. Structured as an ongoing, dynamic programme with no expiry date, the programme is subject to further development according to the progress made.

Initial experience gathered in 2005 and 2006 confirms the success of this approach. The importance of the programme was underlined when, based on the Thematic Strategy on Sustainable Use of Plant Protection Products, the European Commission in July 2006 announced a proposal for a Directive by the European Parliament and the Council on Sustainable Use of Plant Protection Products which required Member States to develop this type of national action plan. While the approach was not questioned in the ongoing negotiations within the EU Council and the European Parliament, certain issues contained in it were discussed in some detail.

This National Action Plan on Sustainable Use of Plant Protection Products builds on the Plant Protection Product Reduction Programme published in 2004. It reflects the experience gained in implementing that programme and current trends in

national and international debate on plant protection. For example, the OECD has given a great deal of attention to the contents of national strategies to minimise the risks arising from the use of plant protection products and has published a wide range of information on this issue. And one of the key forces behind the programme's enhancement was the following decision adopted by Germany's federal and Länder ministers and senators for agriculture on 10 March 2006:

1. The Länder ministers and senators for agriculture acknowledge the report published by the Federal Ministry of Food, Agriculture and Consumer Protection. They pledge their ongoing support in efforts to achieve the objective of further minimising the risks which may arise from the use of plant protection products.
2. By using appropriate measures which are jointly implemented and funded by the federal and Länder governments, processes are to be developed which will assist advancements in integrated plant protection. Those responsible within the federal and Länder ministries are commissioned with the task of agreeing a set of appropriate measures and preparing for their implementation.
3. The Federal Ministry of Food, Agriculture and Consumer Protection is requested to regularly report to the Länder ministers and senators for agriculture on the progress made.

This National Action Plan was formally approved at the Conference of Agricultural Ministers meeting held on 11 April 2008. Apart from the issues already covered, it takes in innovation promotion and the advancement of integrated plant protection. It thus serves in preparing for future requirements that could arise from the European Parliament and Council Directive on Sustainable Use of Plant Protection Products.

Integrated plant protection is the globally accepted model for sustainable plant protection in conventional agriculture. The FAO Code of Conduct on the Distribution and Use of Plant Protection Products

adopted in 1985 cites integrated plant protection as a key component of sustainable plant protection. Germany's Plant Protection Act (Pflanzenschutzgesetz) has referred to it since 1986. In 1991, Council Directive 91/414/EEC Concerning the Placing of Plant Protection Products on the Market provided a standardised definition of the term for uniform application in all EU Member States.

Integrated plant protection constitutes an holistic, long-term on-farm plant protection strategy aimed at achieving a balance between environmental, economic and social needs by reducing the use of chemical plant protection products to the necessary minimum and using non-chemical plant protection methods instead. It requires careful consideration and weighing of relevant issues in all decision-making processes and places high expectations as regards the availability and use of specialist information. Longitudinal studies show that the practice of integrated plant protection not only results in lower quantities of plant protection products being used, but also lessens the overall risk to humans, animals and the natural environment arising from the use of chemical plant protection products.

This is why the National Action Plan focuses on risk reduction rather than setting specific quantity reduction targets. Across-the-board reductions in the quantities of plant protection products sold fail to account for the characteristics of the substances involved and the potential risks arising from their

use. For example, with a quantity-based approach, the use of a high-risk plant protection product which is effective in small quantities would be more positively assessed than use of a lower-risk product that must be used in greater quantities to achieve the desired result.

Risk index analyses for the past 20 years show that Germany's plant protection policies have lessened the risk to the natural environment by over 50 percent and in some cases by as much as 90 percent. The year 1987 was used as a base year for the calculations, as that was the year in which significant legislative changes were introduced with the enactment of a completely revised Plant Protection Act. The National Action Plan is designed to build on this approach and provide incentives for further risk reduction.

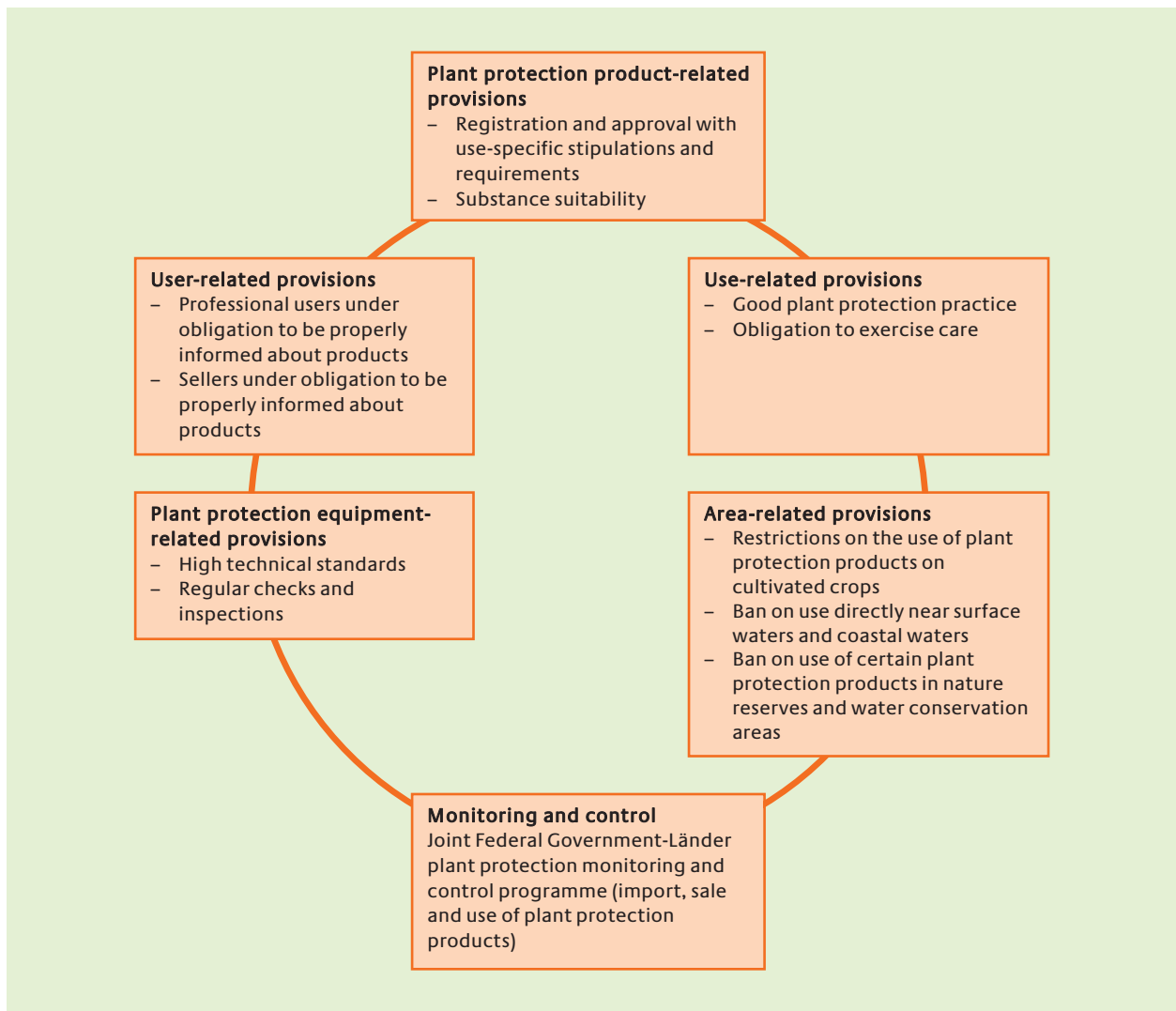
The programme also complies with Item 3: Risk Reduction and Prevention Strategies in the Federal Ministry of Food, Agriculture and Consumer Protection prevention programme to protect consumers from health-impairing residues of plant protection products in food. Cross-compliance rules for the plant protection sector which went into effect on 1 January 2006 supplement the National Action Plan on Sustainable Use of Plant Protection Products.

Fewer risks to the natural environment can also serve conservation and promotion of biological diversity. This is one reason why this National Action Plan has been made an integral component of Germany's National Biodiversity Strategy.

2. Legal Basis

The provisions contained in plant protection law cover registration and approval of plant protection products, user-related requirements, use-related requirements, area-specific requirements, plant protection equipment-related requirements and

monitoring and control requirements (Fig. 1). The Plant Protection Act (Pflanzenschutzgesetz, PflSchG) is the primary legislative instrument. An overview of the key legal provisions in plant protection is provided on the Federal Office of Consumer Protection and Food website (www.bvl.bund.de; see English/Plant Protection Products/Legal Regulations).



Components of existing plant protection legislation

Registration and approval of plant protection products is a core component in efforts to minimise the risks which may arise from the use of plant protection products. It goes way beyond preventing the sale of unsuitable substances that can pose a threat to humans, animals, groundwater and the natural environment. When a generally suitable

plant protection product is approved, stipulations are also made on key aspects of its use. This takes the form of provisions on the areas in which and the way in which it can be used. The approval process assumes that the provisions contained in plant protection law will be complied with at all levels.

Plant protection-related legal provisions are also contained in other legislation on issues such as food law (protecting consumers against plant protection product residues), hazardous substances (protection of users, transport and storage) and nature conservation (protection of threatened species).

The provisions of plant protection law are designed to provide a high level of protection for humans, animals, groundwater and the natural environment. Monitoring and controls for compliance with plant protection law are thus urgently needed.

The necessary legal instruments are already in place to ensure informed plant protection and to remedy known deficits in enforcement. However, legal provisions are not enough to provide sustainable plant protection. Apart from compliance with statutory requirements, the principles of good plant protection practice must be adhered to and thus those of integrated plant protection. This includes limiting the use of plant protection products to the necessary minimum. This is all the more achievable the more people are aware that achieving sustainable plant protection is reliant on greater acceptance by consumers and is a key component in securing long-term income for farmers and other crop-growers.

3. Objectives

The aim of this National Action Plan is to further reduce the potential risks arising from the use of plant protection products.

In particular, the use of chemical plant protection products must be limited to the necessary minimum in order to avoid their unnecessary use and increase the use of non-chemical plant protection methods. The main focus of such measures is the promotion of innovation in plant protection and advancement of the integrated plant protection approach. This will be served by appropriate measures which are jointly implemented and funded by the federal and Länder governments.

The measures in question are designed to:

1. Reduce the risks to humans, animals and the natural environment which arise from the use of chemical plant protection products and reduce the quantities of plant protection products used. This involves:
 - = Significant reductions in the use of chemical plant protection products that are currently used to excess.
 - = Substituting a significant proportion of chemical plant protection methods with non-chemical methods.
2. Further reduce residues of plant protection products in domestic and imported agricultural products, making a key contribution to preventive consumer protection.
3. Improve the economic situation for farmers by avoiding costs for unnecessary use of plant protection products.

When it comes to implementing the package of measures contained in this National Action Plan, expert estimates assume that the risks to the natural environment arising from the use of plant protection products can be further reduced in the coming years. It can be expected that by 2020, the risk potential can be reduced by a further 25 percent. The calculations are based on the average figures for the period 1996 to 2005.

4. Measures

4.1 Complying with the necessary minimum requirement when using plant protection products

The use of chemical plant protection products on farms and holdings must be kept to the necessary minimum.

In the use of chemical plant protection products, the **necessary minimum** is the term used to describe the amount needed to ensure crops are successful, not least as regards their economic viability. It assumes that all other practicable options to prevent and deter harmful organisms have been exhausted and that consumer, environment and user protection provisions have been adequately taken into account.

The decision of farmers, gardeners or foresters regarding the use of plant protection products to protect their crops is not only dependent on statutory provisions.

Their decisions are based on a number of factors:

- a) Economic and/or agricultural policy requirements:
- Potential sales of their agricultural products
 - Production costs (incl. personnel and equipment)
 - Yield and quality assurance
 - Production according to special agreements with the receiver side (e.g. sales agreements, contract cultivation, certification)
 - Participation in promotional programmes to improve the environment (such as agri-environment programmes), specific economic practices (such as organic farming)

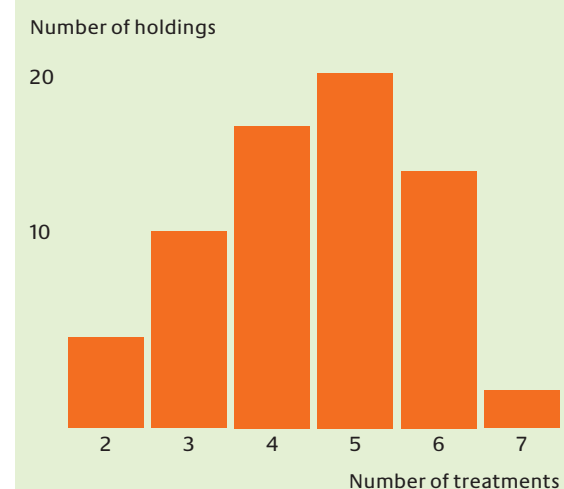
- b) Prevailing conditions affecting plant protection activities (such as the weather).

Given the ever-changing conditions in agriculture and the fact that they are difficult to predict (weather and occurrence of pests), the decisions made on individual farms and holdings differ accordingly and result in a certain degree of fluctuation in the use of plant protection products. Also, practitioners' decisions on what constitutes the necessary minimum in the use of plant protection products depend on their professional training, experience, attitude to risk and the quality of the advice and other specialist information they act upon.

This variance is also mirrored in statistics on the use of plant protection products and in other farm-related studies. It can be explained not only in respect of situation-related objective conditions, but more so by the fact that the necessary minimum as defined in the Plant Protection Act when referring to integrated plant protection is not always adequately taken into account in everyday practice.

This allows a statistical approach to be identified in determining the necessary minimum in the use of plant protection products. The necessary minimum can be determined at regional level in the form of a target corridor centred around the average of the

Example of frequency distribution regarding the use of plant protection products on winter wheat in a specific region



treatment index for the specific crop, with the corridor range determined by convention taking account of data from suitable reference farms. If the treatment index in a particular farm exceeds the target corridor, it does not automatically mean that the necessary minimum is exceeded. A check should however be made to determine the extent to which the excess is justified or whether unnecessary treatments have been applied.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** will use appropriate measures and information (e.g. data on the use of plant protection products and data taken from reference farms) to require agricultural and horticultural farms to ensure better compliance with the necessary minimum requirement and to avoid unnecessary uses wherever possible. These measures include a targeted advisory service.

Agricultural associations and other affected organisations support this work.



4.2 Research and Promotion of Innovation Towards Integrated Plant Protection

4.2.1 Federal Ministry of Food, Agriculture and Consumer Protection Innovation Promotion Programme

Integrated plant protection is characterised by the fact that it takes in new methods and other innovations in a dynamic way in order to achieve the objective of reducing the quantities of plant protection products used to the necessary minimum. It is thus necessary to enhance existing methods for integrated plant protection and to develop where possible new methods and integrate them into crop-growing methods and systems.

The BMELV Innovation Promotion Programme offers opportunities to accelerate such innovation, not least because new technologies help affected businesses to enter new markets.



The programme's main focus lies in innovative plant protection methods which help limit the use of plant protection products to the necessary minimum and reduce the potential risks to humans, animals and the natural environment. The type of methods to be promoted include:

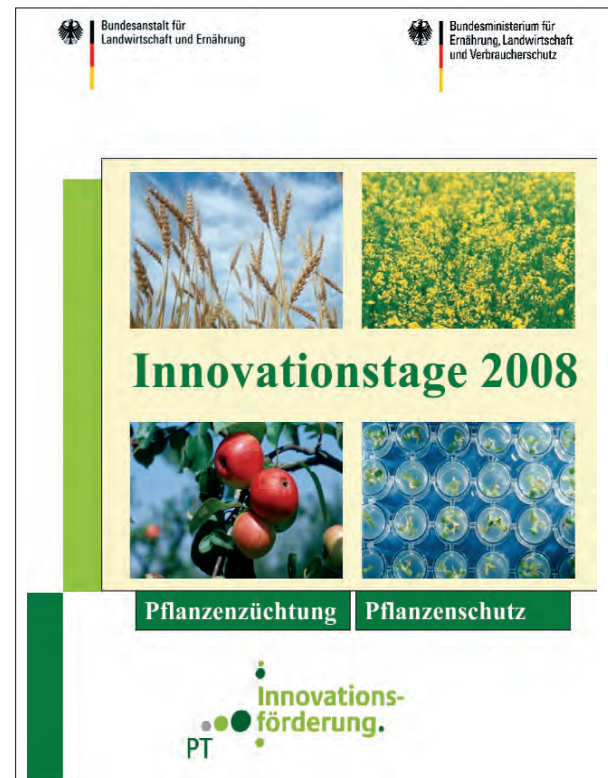
- Development and practical implementation of new methods of integrated plant protection
- Optimisation of biological, chemical, mechanical and other plant protection methods

- Enhancement of forecasting models and decision support tools for situation-specific and/or area-specific use of plant protection products
- Development and optimisation of plant protection equipment with a view to reducing the use of plant protection products and saving resources
- Devise and put into everyday practice strategies to prevent pests building up a resistance to plant protection products
- Optimised diagnosis of plant pests by means of faster, more sensitive and more specific diagnosis procedures
- Improve information and advisory structures with a view to reducing the risks arising from the use of plant protection products
- Enhanced transfer of plant protection technology and knowledge

Measure

As part of its programme to foster innovation, the **Federal Ministry of Food, Agriculture and Consumer Protection** promotes innovative plant protection methods with the aim of reducing the risks posed to humans, animals and the natural environment in connection with the use of plant protection products.

The German states (**Länder**) and the **affected associations and organisations** support the introduction of new, innovative plant protection methods in everyday practice.



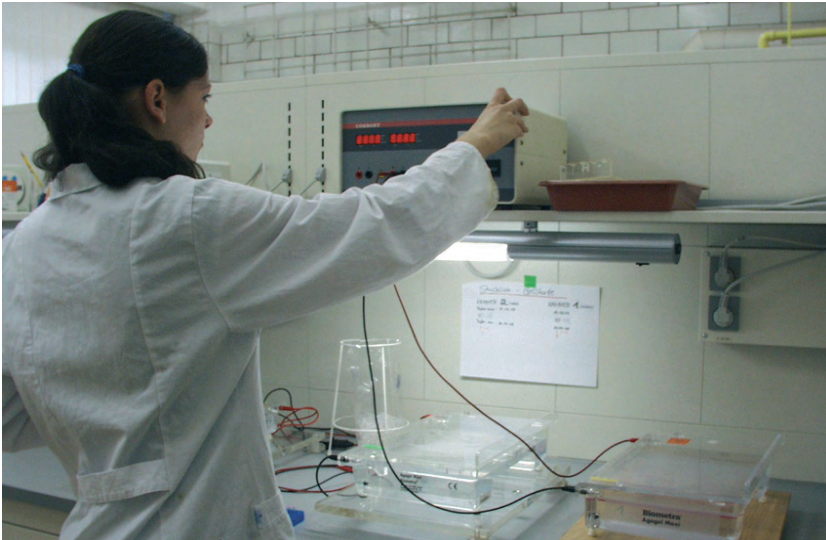
Cover of a document giving an overview about the "Innovation-Days 2008"

4.2.2 Research and development to foster innovation

The Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) and the respective departments of the Länder administrations support research and development activities whose main focus assists in achieving the objectives set out in the National Action Plan on Sustainable Use of Plant Protection Products. BMELV and the Länder must inform one another of such activities and exchange views and ideas on their results by attending specialist conferences at reasonable intervals.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** review their respective research and development plans and inform one another accordingly. The Julius Kühn-Institut hosts thematic talks, seminars and conferences in which current research and development findings are reported on and discussed.



Diagnosis of harmful organisms in a PCR laboratory

4.2.3 Development, testing and transfer of non-chemical plant protection methods

While a range of non-chemical plant protection methods such as the use of resistant varieties, preventive cultivation techniques and biological, biotechnological and other processes are already available, they must be enhanced and optimised. New methods must also be developed. These methods must be better integrated into existing plant protection schemes.

Testing and transfer of new or improved non-chemical plant protection methods and their introduction into everyday practice take high priority in the National Action Plan. The more low-risk, practicable and economically viable non-chemical plant protection methods are introduced, the lower the quantity of chemical plant protection products used.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** support the timely development and introduction of non-chemical plant protection methods into everyday practice. This includes trials, field days and model projects. The Julius Kühn-Institut supports these activities by providing information on non-chemical plant protection methods.

4.2.4 Advancing computer-aided forecasting methods and decision support systems

Computer-aided forecasting methods and decision-making tools are among the most important instruments in integrated plant protection and many plant protection advisory services already use them as a source for their early warning reports. When it comes to key pests, such forecasting methods provide practitioners and advisers with decision-making tools to deal with regional and crop-specific issues. They help keep the use of plant protection products to the necessary minimum and to an exact application schedule. This increases the effectiveness of individual applications of chemical plant protection products and avoids unnecessary use.

Also, expert systems for optimised plant protection have been developed which contain forecasting modules and prevention thresholds together with instructions on situation-specific application of approved plant protection products.

The advancement and broad use of computer-aided forecasting methods and expert systems by advisory services and as decision support systems for practitioners are instrumental to the success of the National Action Plan. Enhancement of existing methods and the development of new methods for other key pests are urgently needed to ensure targeted prevention of harmful organisms.



Example of computer-aided forecasting methods and decision support systems

Before recommending it for general use, it is vital that practice maturity be sufficiently tested in cooperative efforts with research, advisory services and practitioners.

4.2.5 Advancing plant protection equipment and introducing new technologies into everyday practice

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** support the development, testing and validation of new and enhanced computer-aided forecasting methods and decision support systems. This includes the introduction of such methods into everyday practice.

In the past 20 years, advancements in plant protection technology have brought considerable progress in plant protection. Working methods have improved and risk has been reduced considerably thanks to new, drift-reducing plant protection equipment. The technological potential as regards plant protection equipment has nowhere near been fully exploited.



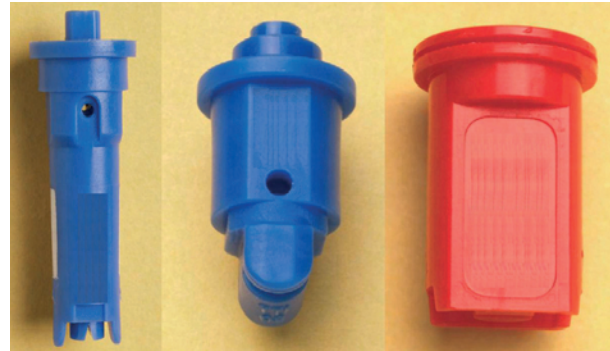
Tunnel sprayer used in orchards to reduce drift

New plant protection equipment that allows safe, targeted and reduced use of plant protection products is instrumental in achieving the objectives set out in the National Action Plan on Sustainable Use of Plant Protection Products. While strategies which allow 'precision farming', meaning situation-specific application of the minimum possible amount of such products, already exist, practicable solutions have still to be found in many instances. The high-level investment needed hinders the introduction of new methods.



Sensor-controlled sprayers for orchards

The advancement and implementation of new complex technologies (e.g. GIS-guided systems, optoelectronic recognition techniques and GPS) into everyday practice are still reliant on considerable research and development efforts.



Injector nozzles to reduce drift

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** support the introduction into practice of new plant protection equipment and technologies that provide for reduced spray drift and use of lower quantities of plant protection products.

4.2.6 Promoting resistance research and breeding of resistant varieties

Resistant varieties are a core component of integrated plant protection methods. The varieties grown are, however, never resistant to all biotic and abiotic influences; existing resistances are often broken down due to adaptation by harmful organisms.

It is thus of utmost importance that breeding of resistant and marketable varieties be advanced in an ongoing process and new approaches be researched in resistance breeding. Once new varieties with improved traits are on the market, their availability should be announced among others by the respective industry associations, by means of field days and in articles in the specialist press.

One example from the horticultural sector is the Allgemeine Deutsche Rosenneuheitenprüfung (ADR) [Performance Testing of New Rose Varieties in Germany]. Using independent test gardens, it makes a vital contribution to evaluation of healthy varieties and thus promotes breeding of high-performance, disease-resistant roses. The ADR

scheme gives breeders and users an objective criterion with which to assess rose varieties and promotes resistance breeding.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** support resistance research and the introduction of new resistant varieties into crop-growing practice. The respective **professional associations** support the breeding and bringing to market of resistant varieties.

4.2.7 Demonstrate new integrated plant protection methods

Demonstration of new methods which serve the National Action Plan on Sustainable Use of Plant Protection Products provides a key interface between research and development on the one side and everyday practice on the other. All available options are to be used for the purpose.

On demonstration farms, new methods can be developed (not least as part of research and development projects) and easily tested and demonstrated. Under everyday conditions, the positive traits, peculiarities, uses and potential risks of new methods and plant protection strategies are demonstrated.

Field days held by the Julius Kühn-Institut, the German Agricultural Society (DLG), the Länder and producers of plant protection products provide an important platform for the demonstration of new methods and knowledge that can serve the National Action Plan on Sustainable Use of Plant Protection Products. As with demonstration farms, field days provide a key forum for intensive discussion and evaluation of methods when put into practice. With targeted activities such as model projects, the introduction of new integrated plant protection methods can be fostered in a targeted way (model farms).



Test site at the Julius Kühn Institute

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder**, **professional associations** and the **plant protection products industry** support the introduction into everyday practice of new integrated plant protection methods. Among other things, this can take the form of demonstration farms and field days.

4.2.8 Crop and sector-specific guidelines on integrated plant protection

Integrated plant protection is defined in Germany's Plant Protection Act and principles of integrated plant protection are also described. There are however no specific and generally accepted guidelines on integrated plant protection for key crops and crop groups or sectors which could serve as a basis for crop-growing regulations.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder** and the respective **professional associations** work with consumer protection organisations and environmental and nature conservation NGOs to develop specific and generally accepted guidelines for integrated plant protection for key crops, crop groups and sectors. **Professional associations and relevant institutes and organisations** transpose these guidelines into specific crop-growing regulations.

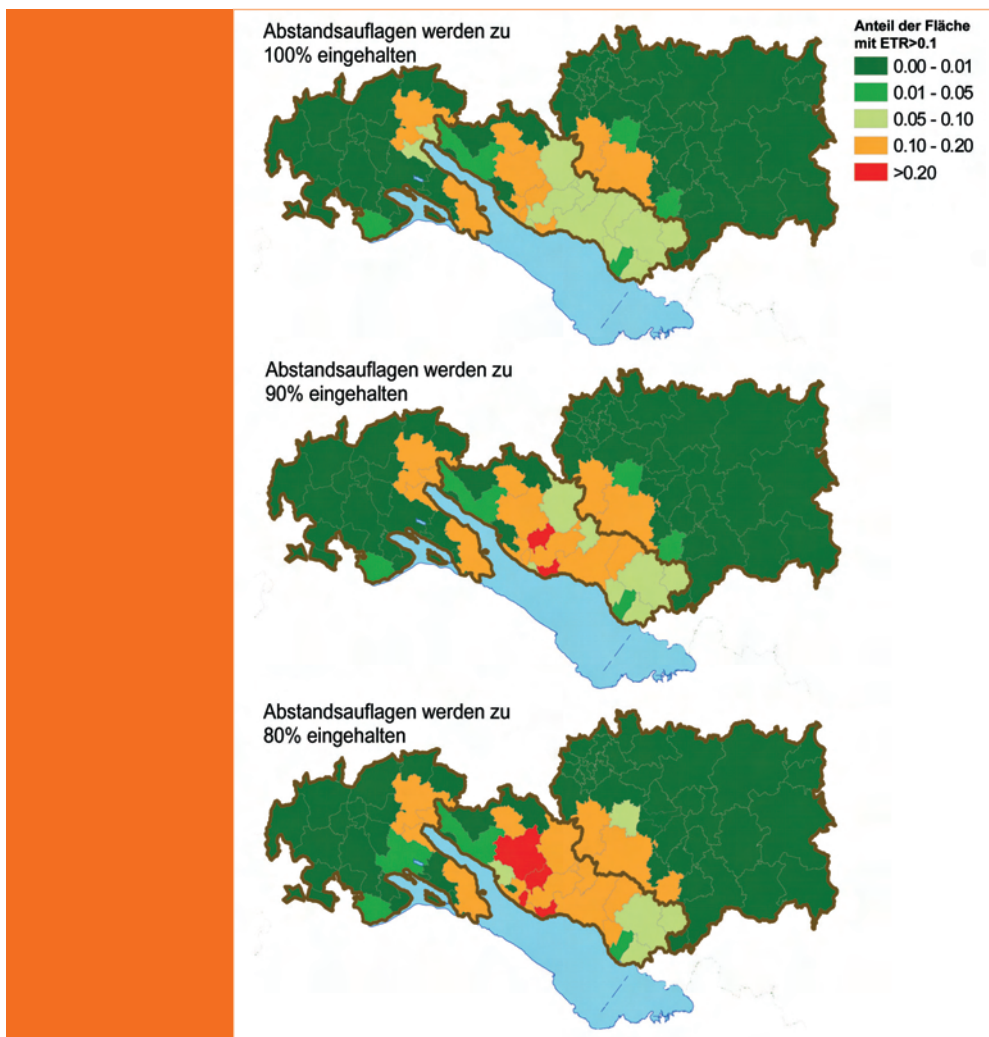
4.2.9 Hot spot management

Temporally and spatially defined fields of action with increased risk (hot spots) associated with plant protection products can occur for the following reasons:

- Specific environmental conditions (e.g. high waterbody density, high soil porosity)
- Wide-spread and frequent use of a few plant protection products
- High-frequency, crop and pests-related use of a specific plant protection product over a single area in connection with other conditions, such as frequent rainfall on soil threatened by erosion.

Because these specific conditions are not necessarily taken into account in nationwide approval of plant protection products, the Plant Protection Act places users under obligation to exercise special care.

In the past, it has been difficult to identify hot spots according to the precautionary principle due to the lack of the necessary instruments. Now, plant protection and environmental risk models can be used in connection with GIS data. Once hot spots have been identified, appropriate measures must be developed and implemented to improve the situation as regards consumer and environment protection. This can include regional advisory models such as measures to reduce risk in the use of plant protection products or targeted active substance management.



Risk assessment based on the assumption, that buffer zones are observed

Effective hot spot management plays a key role in achieving the objectives set out in the National Action Plan on Sustainable Use of Plant Protection Products because it identifies and either reduces or prevents the potential risks to consumers and the environment. To develop and implement appropriate hot spot management strategies, cooperation is needed between the agencies and research institutes belonging to the Federal Ministry of Food, Agriculture and Consumer Protection, the Länder, industry associations and practitioners.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** identify temporally and spatially defined fields of action involving heightened risk (hot spots) associated with the use of plant protection products. They develop targeted and appropriate measures to improve the situation as regards consumer and environment protection (hot spot management strategies).

The **respective industry associations, institutes and organisations** support the implementation of the management strategies.

4.2.10 Promotional programmes to foster integrated plant protection methods and organic farming

Numerous integrated plant protection methods (especially non-chemical plant protection measures which include biological plant protection) are not practiced because the costs far exceed the benefits derived from the measures taken. Under special funding programmes, there is the option of creating a financial balance which supports the use of non-chemical methods. A prime example involves biological control of the European corn borer using *Trichogramma* egg parasites on some 7,000 ha of maize crops. Measures of this scale go way beyond that of good plant protection practice.



Organic farming is promoted under the EU's Common Agricultural Policy and by a range of measures initiated both by the Federal Ministry of Food, Agriculture and Consumer Protection and the Länder. When it comes to plant protection in organic farming, there is only a limited range of approved plant protection products available. Organic farming relies largely on non-chemical plant protection methods in order to prevent the occurrence of harmful organisms to the extent possible or to deter them altogether.



Organic farming serves in reducing the quantities of plant protection products used. The National Action Plan on Sustainable Use of Plant Protection Products primarily relates to conventional farming. For this reason, promotion of organic farming is seen as a vital yet supporting measure. An increase

in the share of organic farming over time is therefore to be supported as a contribution towards achieving the aims of this National Action Plan.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** give adequate consideration to integrated plant protection methods and organic farming in their funding programmes.

Measure

With the support of the **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder** implement measures to secure specialist knowledge and to boost vocational and further training opportunities for professional users and distributors of plant protection products and for private and public plant protection advisers. Vocational and further training strategies must be enhanced and expanded. This includes the drafting and publication of a set of guidelines on vocational and further training and education in plant protection.

4.3 Improved knowledge and information

4.3.1 Securing knowledge for users and the retail sector

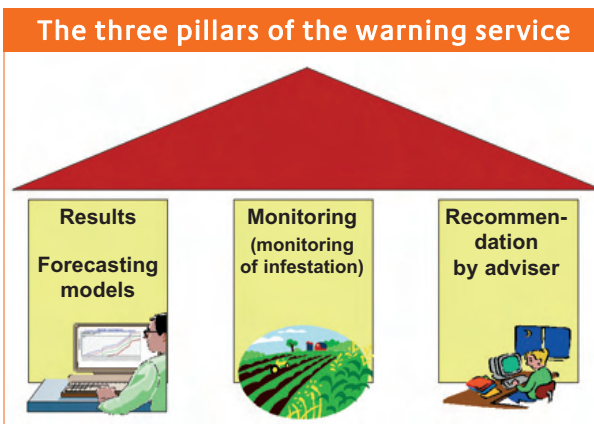
Adequate knowledge is a fundamental prerequisite for legally compliant and informed use of plant protection products. Professional users and distributors of these products must thus possess knowledge as defined in the Plant Protection Act (Pflanzenschutzgesetz). Proof of the required specialist knowledge and skills is governed by the Regulation on Expert Knowledge in Plant Protection (Pflanzenschutz-Sachkundeverordnung).

Poor practice in plant protection is often due to inadequate knowledge. For this reason, professional users and distributors of plant protection products must have the required knowledge. An important aspect in this regard is vocational and further training and education for professional plant protection users and distributors.

It can be expected that securing general and specialist knowledge will be instrumental in achieving the objectives set out in the National Action Plan on Sustainable Use of Plant Protection Products. Vocational and further training measures must be conducted regularly and be target-group oriented, even if this means additional expenditure for all concerned. The measures must be funded and supported by the respective professional associations and by practitioners.

4.3.2 Improved plant protection advice

Responsibility for providing plant protection advice, education and training is assigned to the Länder under Section 34 of the Plant Protection Act. Scientifically founded advice on plant protection and phytomedicine, including early warning services, is a vital prerequisite for compliant and informed plant protection. Official advisory services provided by the Länder should assist communication of legal provisions and support the introduction of new, integrated plant protection methods and particularly those involving non-chemical approaches. This involves the provision of information to improve users' knowledge and thus serve society as a whole.



To implement the National Action Plan on Sustainable Use of Plant Protection Products, it is vital that effective, independent public advisory services be provided on plant protection and phytomedicine.

These efforts must be supported by the use of modern media, computer-aided decision support tools and communications systems to ensure adequate provision of current information.

Existing communication systems (e.g. hortigate and ISIP) must be fed with data to ensure users receive comprehensive and timely provision of the latest information on plant protection practices as required under the National Action Plan.

Measure

By means of effective and independent plant protection advisory services, the **Länder** support the contents of the National Action Plan on Sustainable Use of Plant Protection Products. The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** produce informational material and support the development of computer-aided decision support tools.

4.3.3 Online plant protection portal

To ensure the success of the National Action Plan on Sustainable Use of Plant Protection Products and advancement in integrated plant protection, it is of key importance that a neutral source makes available the necessary specialist information on plant protection and phytomedicine to trainers, advisors, distributors and practitioners.

Under Section 33 of the Plant Protection Act, the Julius Kühn-Institut has a legal obligation to provide information on plant protection. Given this statutory obligation, it must develop mechanisms to consolidate and transfer available knowledge.

In a dedicated online plant protection portal, data and information on plant protection will be accessible to all interested parties. This includes general,

easy-to-understand information for consumers. The results of the Institute's work benefit consumers and environmental protection and nature conservation activities in the cultural landscape by providing points of reference for farm-specific advisory services.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** supports the establishment and maintenance of an online plant protection portal to ensure qualitatively, quantitatively effective communication of specialist information and of general, easy-to-understand information for consumers and other affected parties. The **Federal Ministry of Food, Agriculture and Consumer Protection**, the **Länder** and the affected parties draw up informational material on plant protection, the National Action Plan on Sustainable Use of Plant Protection Products, the opportunities and limits, and the benefits and risks involved in preventive non-chemical and chemical plant protection methods.

4.4 Compliance with plant protection provisions

In plant protection, the primary goal of monitoring and control is to ensure compliance with plant protection provisions and to prevent unauthorised sale and incorrect use of plant protection products. The ultimate aim is to avoid potential risks to human and animal health and to the natural environment which could arise from the use of inappropriate plant protection products, their non-compliant or incorrect use, or from other plant protection measures which do not reflect good plant protection practice.

Plant protection monitoring activities are a Länder responsibility. A joint Federal Government-Länder Plant Protection Monitoring Programme to monitor marketing and use of plant protection products was introduced in 2004. It has proven successful and is subject to ongoing enhancement. To improve its effectiveness, monitoring activities are becoming increasingly targeted in line with risk analysis principles. The programme provides for an annual status report.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** are committed to implementing and enhancing the Joint Federal Government-Länder Plant Protection Monitoring System. Annual progress reports are published online by the Federal Office of Consumer Protection and Food Safety (BVL).



A nationwide monitoring programme improves transparency in plant protection efforts and is an integral part of effective risk management. National implementation and further development of the plant protection monitoring programme will thus play a key role in activities conducted under the National Action Plan on Sustainable Use of Plant Protection Products.

4.5 Consumer protection: Reducing plant protection product residues in food

Reducing exceeding of maximal residue levels

To protect consumers against the health risks arising from plant protection product residues, special attention must be given to effective monitoring of plant protection product residues in food from domestic and foreign production. The target set in the 2004 Chemical Plant Protection Product Reduction Programme, to reduce exceedings that go beyond the maximum allowed levels by setting a percentage quota, must be reviewed. Compliance with the statutory norm is assumed and both distributors and producers must recognise their obligation in this regard. A certain percentage of identified exceedings can also be an indication of effective, risk-focused sampling activities performed by the food monitoring authorities.

It has been shown that using risk-oriented residue data collected during food monitoring activities is unreliable when it comes to identifying trends in residue-related risk to consumers. Changes in statutory requirements must also be taken into account. It is thus necessary to use representative data to identify the current status and to use the information gleaned to observe current trends.

EU Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of plant protection products in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC applies in full as of 1 September 2008. Apart from compliance with legal provisions, the planned monitoring activities provide for the use of representative data to identify consumer exposure levels. Bearing these requirements in minds, the Federal Government-Länder working group will review current food monitoring provisions contained in Section 50 ff of Germany's Food and Feed Code (LFGB) when drafting a new plant protection product residue monitoring programme.

Presenting residue data

The Federal Office of Consumer Protection and Food Safety (BVL) in conjunction with the Länder has developed a new approach to presenting residue data for fruit and vegetables which provides greater transparency as regards residue distribution. The data is categorised for each kind of fruit and vegetable according to how the amounts of each identified plant protection product substance are distributed across the full range of samples. This allows both industry and consumer associations a better overview of the residues measured. This in turn enables the effectiveness and any quality management measures taken to be assessed in terms of preventing maximum residue levels being exceeded.

Multiple residues

EU Regulation 396/2005 provides among other things for administrative measures for the development of methods to identify cumulative and synergistic effects on human health. In the debate concerning multiple residues, scientific issues take priority. The Federal Institute for Risk Assessment (BfR) sparked the debate on this subject at an international workshop. The European Food Safety Authority (EFSA) has since taken up the issue in its work.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** develop a Plant protection product Residue Monitoring Plan to create a representative database which allows trends to be identified and conclusions to be drawn regarding consumer exposure to plant protection product residues.

5. Indicators Used in the National Action Plan on Sustainable Use of Plant Protection Products

5.1 Collection of statistical data on the use of plant protection products

The NEPTUN network (**Netzwerk zur Ermittlung der Pflanzenschutzmittelanwendung in unterschiedlichen, landwirtschaftlich relevanten Naturräumen**) serves collection of crop and regional-specific data on the use of plant protection products. NEPTUN analyses take in a representative number of farms for the various crop groups in the respective regions of Germany. The farms are selected by means of random sampling. The surveys are carried out by the professional association and the Julius Kühn-Institut checks and evaluates the anonymised data. The Länder participate in plausibility assessments.

The data collected on the use of plant protection products forms the basis on which to calculate the indicators used in this National Action Plan on Sustainable Use of Plant Protection Products.

This includes the Standardised Treatment Index and the SYNOPSIS risk indicator.

Measure

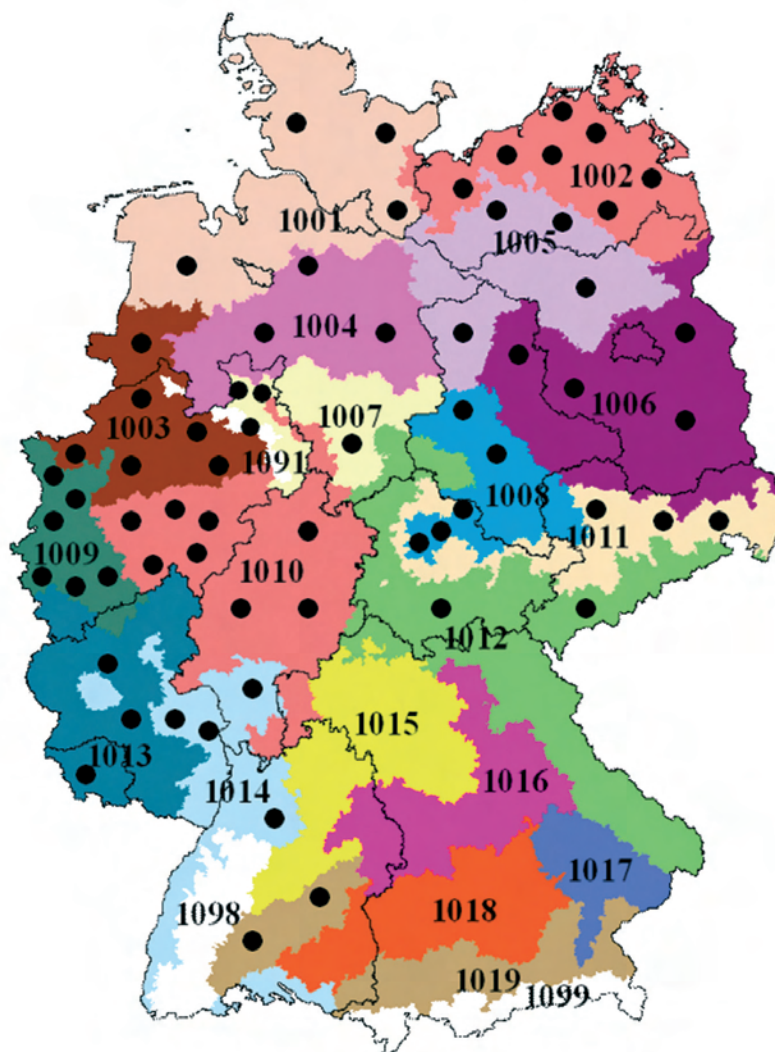
The professional associations and, where necessary, other organisations conduct regular surveys using the NEPTUN survey criteria agreed with the Julius Kühn-Institut. The **Federal Ministry of Food, Agriculture and Consumer Protection** is granted the right to use the data in line with a contractual agreement and uses it to calculate the treatment index and risk indicators.

The **Länder** participate in the plausibility assessment of the collected data.

5.2 Network of reference farms to assess the levels of plant protection products used

In addition to the NEPTUN analyses, it is important to establish a network of reference farms for crop-growing, horticulture, fruit-growing, wine-growing, hops and other production sectors as appropriate. These reference farms are overseen by the Länder. They serve as a reference regarding plant protection product use in farms in a given region and provide annual data on plant protection product use. The data is used to calculate the treatment index.

Distribution of the reference farms for arable crops in 2007



They also provide background information on the necessary minimum of plant protection products used in each year and region. This information is needed because it is the only way to explain fluctuations in the use of plant protection products (e.g. varying weather conditions and regional differences in variety choice).

The main aims in this approach are:

1. Annual calculation of the treatment indices for a farm's key crops

The treatment indices calculated for each crop grown on the reference farms are designed to document and illustrate plant protection product-related practices on farms in a given region and year. This should highlight any unusual occurrences in the use of plant protection products on specific crops on a given farm or in a given year or region. The evaluation of the data is accompanied by a check against NEPTUN data which is collected every two to four years.

Due to the high number of random samples, the NEPTUN statistics allow identification of the average quantity of plant protection product used, the frequency of use and the corridor of average use in specific regions. In contrast, the reference farms do not provide statistically representative treatment index averages per region. Rather, they serve as examples within the total number of farms in a region and provide annual data.

2. Expert evaluation of year-specific treatment indices

The year-specific treatment indices for the various crops grown on the reference farms are purely of a statistical nature. They must be analysed in conjunction with background information, especially as regards the rate of infestation under year-specific conditions and as regards evaluation of the necessary minimum. This can only be done by the Länder plant protection services or their agents.

The statistics and expert comments give farms in a given region an idea of what constitutes the necessary minimum. The information thus serves in identifying reduction potential and makes a key contribution to achieving transparency in plant protection. For example, the data can help users learn how objective influences (such as weather, the occurrence of pests, costs and returns) and subjective influences (e.g. knowledge and risk-related behaviour) affect the quantities of plant protection products used in a given region or year.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the **Länder** manage a network of reference farms in which annual data on the use of plant protection products is collected. The quantities used are identified for each farm and then subjected to expert evaluation. The farms join the network on a voluntary basis.

5.3 Treatment index: Levels of plant protection products used

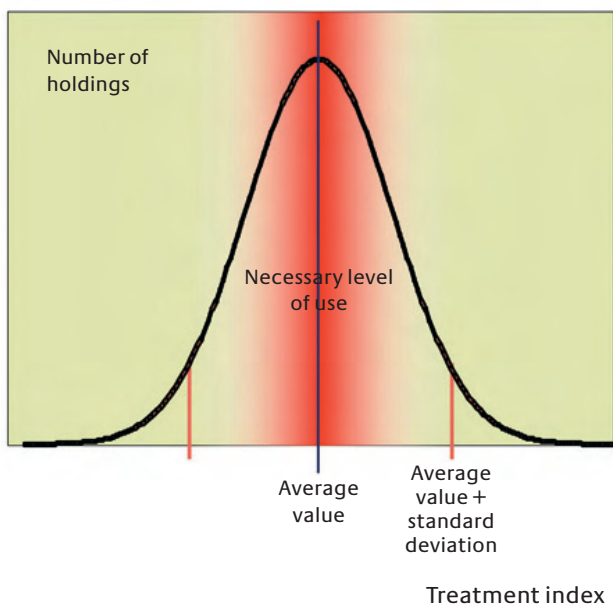
The treatment index lists the number of times a plant protection product is used on a given piece of land, crop or farm, taking account of any reductions in the amounts used and whether only partial areas of land are treated. Plant protection products applied in mixed tanks are listed separately.

When calculating the treatment index, the use of a plant protection product in the maximum amount allowed per application (target organism on the crop) receives a score of 1.0. If the amount used is reduced by, say, half, the treatment index score drops to 0.5. If the plant protection product is applied to just part of the crop area in question, perhaps to only 50 percent, the treatment index score also falls to 0.5. The scores are then added in accordance with the number of plant protection product applications for each growing year. If the indices are averaged for a selected unit (e.g. Germany, survey region, farm), a representative

index can be calculated given a large enough number of random samples.

Treatment indices are particularly suited to documentation of the various intensities in the use of plant protection products on crops, fields, farms and in given regions and years. Multiyear data can be used to identify trends.

Treatment index in a specific region



The existing NEPTUN surveys and other studies conducted on farms have shown that in the use of plant protection products on a specific crop, there is large variance in the treatment index between farms that work under similar locational conditions (survey regions). For each survey region where sample numbers are representative, statistical measures such as means and standard deviations can be calculated in order to plot this variance, and statistical tests can be carried out to identify significant temporal trends in the treatment index. It is also possible to rank the active substances used according to plant protection product (herbicide, fungicide and insecticide) and crop type.

Measure

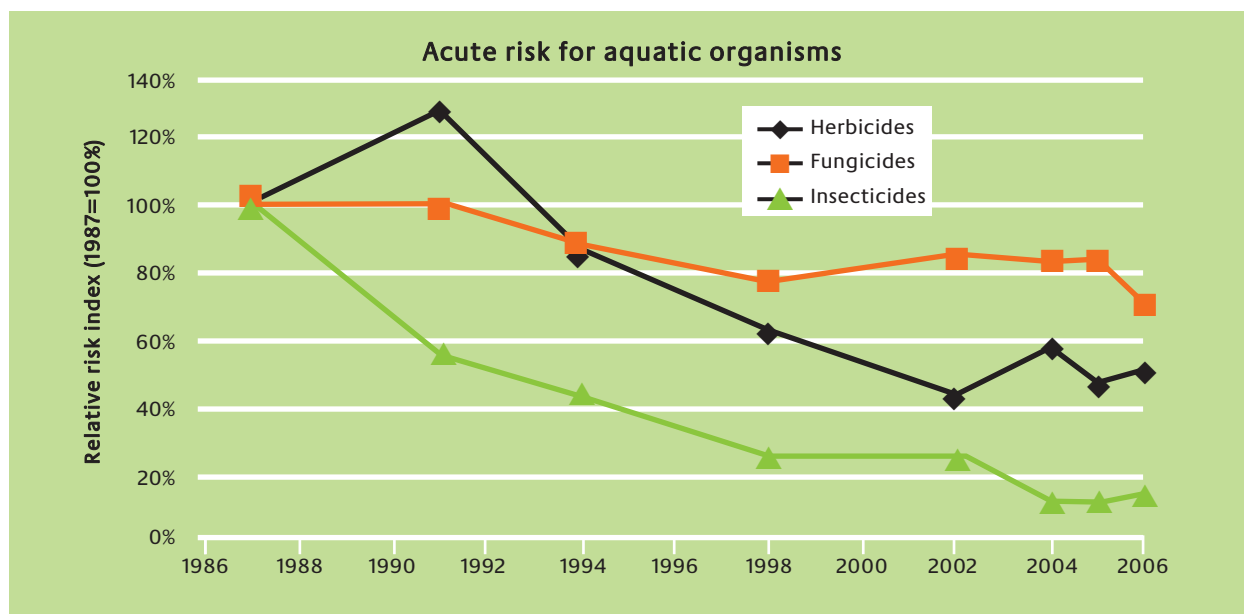
Using available NEPTUN data, the **Federal Ministry of Food, Agriculture and Consumer Protection** calculates and publishes the treatment index for crops and regions.

5.4 Plant protection: Risk indicators

The treatment index plots the intensity of plant protection product use. This alone is not enough to identify the risks arising from their use because substance traits and application conditions are not included in the index. It is thus necessary to use a tool which allows the risks arising from plant protection product use to be traced. Reductions in the quantities of plant protection product used, measured against the treatment index, must not be allowed to result in greater risks to humans, animals, the environment or crops. The use of suitable risk indicators in plant protection is a fundamental prerequisite in monitoring the potential risks arising from the use of plant protection products.

Plant protection risk indicators currently focus primarily on the risks to the environment. Computer-aided models such as SYNOPSIS¹ allow identification of relative changes in plant protection product-related risks to aquatic and terrestrial ecosystems.

¹ SYNOPSIS stands for **Syn**optisches Bewertungsmodell für **Pflanzenschutzmittel** (synoptic evaluation model for plant protection products).



When using the SYNOPSIS indicator, which was developed and is operated by the Julius Kühn-Institut, it is important that representative data be available on the use of plant protection products. SYNOPSIS can be used in conjunction with NEPTUN data, data gathered under Section 19 of the Plant Protection Act (domestic reports) and information on plant protection product traits and application methods gleaned during the approval and registration process in order to calculate risk indices for the environment.

The SYNOPSIS model is suited to identifying trends in the risks to the environment which arise from the use of plant protection products. The SYNOPSIS model is subject to ongoing development and will be expanded to take in user and consumer risks. This will involve analysing the findings of the EU HAIR¹ research project and integrating them in a meaningful way into the SYNOPSIS indicator model.

¹ HARmonised environmental Indicators for plant protection product Risk, SSPE-CT-2003-501997

Measure

Using suitable indicators such as SYNOPSIS, the **Federal Ministry of Food, Agriculture and Consumer Protection** will identify trends in potential plant protection product-related risks to the environment and in an ongoing process will enhance the SYNOPSIS model.

5.5 Monitoring of the occurrence of plant protection products in the natural environment

Using SYNOPSIS and theoretical calculations, land areas with graded relative risk are identified in Germany without identifying the actual pressures or impacts from the use of plant protection products. Risk indicators show when chemical plant protection products are likely to pose a threat (risk) to differing components of the environment (e.g. soil and water), but not the actual pressure arising from plant protection products or the potential impacts arising from their use.

It is thus important to use chemical and biological monitoring data to glean information on the actual situation so as to identify potential pressures and obtain better background information on which to base appropriate measures. This could be done, for example, as part of hot spot management activities. Monitoring data of this kind, which is readily available or is collected during general environmental monitoring activities, can be used to validate the risk indicators. They also act as indicators in their own right in that they illustrate the actual situation.

In the aquatic sector there is also the option of using monitoring results obtained under the Water Framework Directive as these contain measurements on occurrences of plant protection products in the 9,800 waterbodies found throughout Germany. Available information on the waterbodies subject to reporting requirements stems from the survey conducted in 2004, in which the pressures and impacts on 9,800 individual waterbodies were only estimated. From 2006 to 2009, an operative monitoring system will be used for the first time to assess the actual status of the selected waterbodies.

Measure

The **Federal Ministry of Food, Agriculture and Consumer Protection** and the affected **Länder** use monitoring data to validate the results of calculations arrived at using risk indicators. Available data will be used wherever possible.

5.6 Long-term studies on the necessary minimum in the use of plant protection products

Long-term studies with various plant protection strategies and aimed at reduced plant protection product use provide data on the necessary minimum in the use of plant protection products and on the options and limits involved in reducing the frequency of plant protection product application and the quantities used. The studies focus on

integrated plant protection, three-course crop rotation, optimal sowing dates, adjusted fertiliser use, suitable soil cultivation methods, avoidance of highly susceptible cereal varieties, use of forecasting methods and threshold values to combat specific pests, use of the most appropriate plant protection product in situation-related doses and expert advisory services in line with integrated plant protection principles.

Long-term studies allow multiyear, complex observations of the treatment indices, yields and harvests, costs and returns, and the energy balance. Such studies must be carried out in different locations in order to achieve representative data for typical crop-growing regions. This provides key points of reference on the differences in the measures necessary in the use of plant protection products in given years or at specific locations.



Apart from the long-term studies conducted by the Julius Kühn-Institut, others were carried out in 2005 in the German states of Bavaria and Lower Saxony. The results have been documented and are evaluated on an annual basis.

Measure

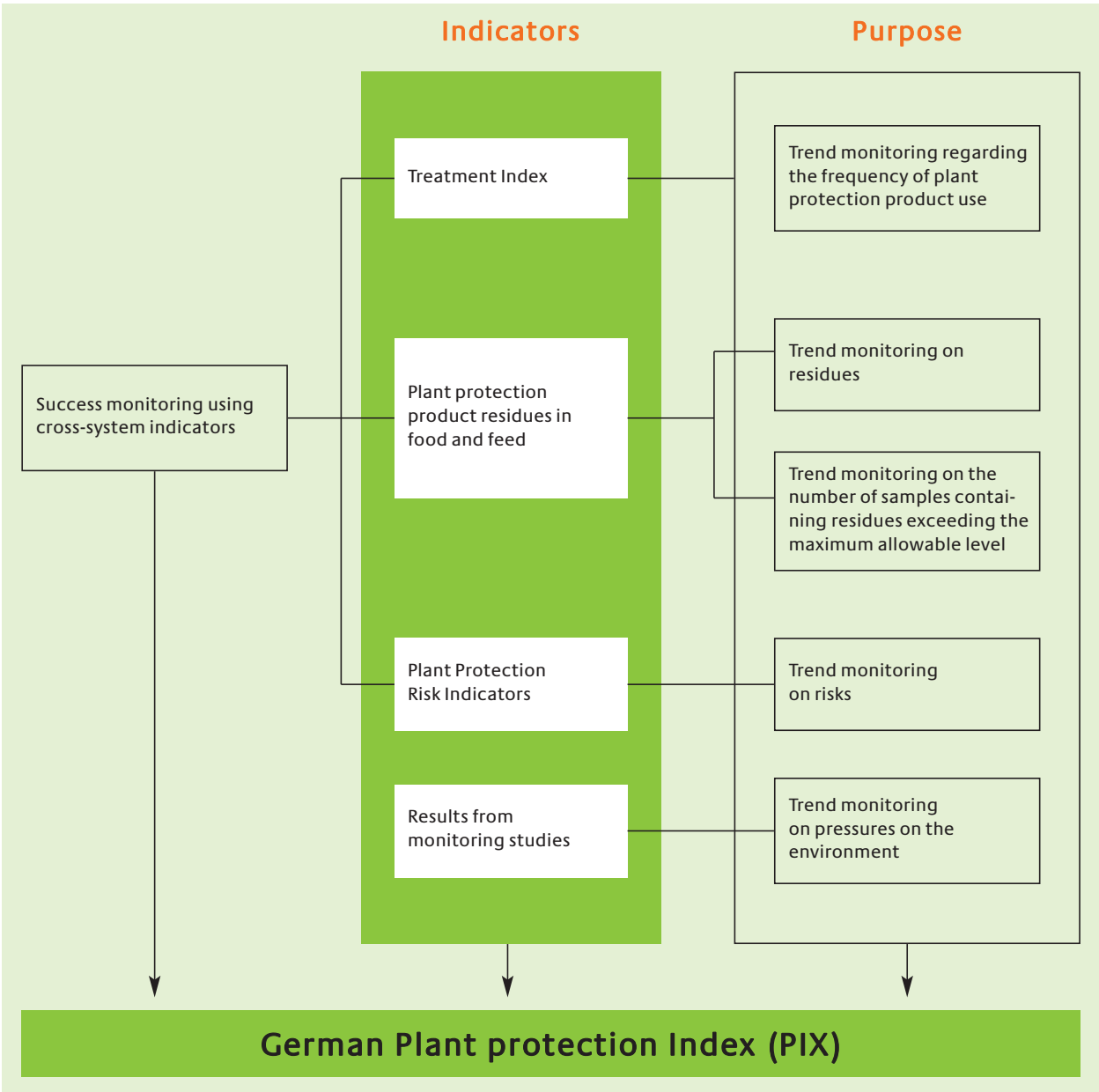
The **Federal Ministry of Food, Agriculture and Consumer Protection** and certain **Länder** support the implementation of long-term studies on the necessary minimum in the use of plant protection products.

6. German Plant protection Index (PIX)

Progress made with the National Action Plan on Sustainable Use of Plant Protection Products will be reviewed using cross-system indicators. These include the treatment index, plant protection risk indicators, measurement results on plant protection product residues in food and feed, and plant protection products found in surface waters and in groundwater.

A self-explanatory, easy to follow illustration of the findings is provided for with the German Plant protection Index (PIX). However, while it allows a complete overview of such results, it does not aggregate the findings to produce a single reference figure.

Measure
 The **Federal Ministry of Food, Agriculture and Consumer Protection** will publish the German Plant protection Index (PIX).



Use of cross-system indicators in the National Action Plan on Sustainable Use of Plant Protection Products

7. Reporting

The Julius Kühn-Institut uses the indicators and measures described above to produce a draft report every three years on the measures implemented under the National Action Plan in the previous three years. The draft report must contain a description of the current status, an analysis of the situation and recommendations for further action.

The draft report is presented to the National Action Plan on Sustainable Use of Plant protection products Forum. The forum discusses the report and suggests possible changes and additions.

8. Supporting and Parallel Measures

8.1 National coordination of the National Action Plan on Sustainable Use of Plant Protection Products

The Julius Kühn-Institut supports the National Action Plan and assumes the following responsibilities:

- Organisation and evaluation of data collected in NEPTUN surveys
- Calculation and refinement of risk indicators
- Studies on the necessary minimum in the use of plant protection products
- Enhancement of good plant protection practice and the principles of integrated plant protection
- Support in public relations work to promote the National Action Plan

- Scientific management of the reference farms
- Drafting of the annual report.

8.2 National Action Plan on Sustainable Use of Plant Protection Products Forum

The Forum constitutes a committee of representatives from the following sectors:

- Consumer protection
- Environment protection and nature conservation
- Agriculture, horticulture and forestry
- Plant protection product approval and registration
- Plant protection representatives from the German states (Länder)
- Länder-specific food safety and animal feed monitoring agencies
- Food processing industry
- Retailers of food and plant protection products
- Plant protection research

The Forum reviews progress made with the Action Plan and makes recommendations for its ongoing enhancement. The Forum managers are answerable to the Plant Protection Section at the Federal Ministry of Food, Agriculture and Consumer Protection.

8.3 Plant protection innovation prize

Farms and businesses that either produce or practice new and innovative methods and techniques which serve achievement of the objectives of the National Action Plan on Sustainable Use of Plant Protection Products in an exemplary way will be awarded the Plant Protection Innovation Prize by the Federal Ministry of Food, Agriculture and Consumer Protection. The actual award process has yet to be decided.

8.4 Industry association commitment to self-monitoring

The industry associations affected by the National Action Plan on Sustainable Use of Plant Protection Products (e.g. farmer associations, plant protection product producers, plant protection equipment manufacturers, food processing industry and the retail trade) are called upon to participate in its implementation by entering into voluntary commitments. They will be allowed to promote associated measures in the course of their own public relations work.

8.5 Involvement of environmental and nature conservation organisations

While environment protection and nature conservation organisations are not directly affected by the National Action Plan's implementation, its objectives and substance overlap with a range of demands made by them. Support in the form of suitable public relations work is thus vital to the success and credibility of the Plan and the measures it contains.

8.6 Resources

Implementing the measures contained in the National Action Plan calls for additional efforts from all concerned.

The Plan's success largely relies on how and to what extent:

- Practitioners are called upon to comply with the necessary minimum to a greater degree than they have so far
- Access to specialist information and its use is improved
- Funding is made available to support research into non-chemical and improved chemical plant protection methods

New priorities must be set to allow existing resources to be used in the following measures:

a) At federal level

- Coordination and support of the National Action Plan by the Julius Kühn Institute
- Support surveys conducted on the use of plant protection products (NEPTUN)
- Calculation of risk indices, identification of risk trends and enhancement of risk indicators for use in plan protection
- Maintenance of the German Plant protection Index (PIX)
- The reference farm network
- Finalisation of the method used to identify hot spots
- Establishment and maintenance of an online plant protection portal

b) At Länder level

- Provision of specialist knowledge
- Improved monitoring and controls
- Advisory services and experimental work
- Coordination of reference farms
- Identification of hot spots and specific measures in these areas.

Also, funding is needed at federal and Länder level to foster:

- More intensive implementation of innovations and components of the integrated plant protection strategy
- More research and development
- Promote methods and processes which serve the National Action Plan.

The federal and Länder governments have a range of different options as regards the provision of funding. The underlying principle is that funding is provided by the respective competent authorities.

9. Summary

The National Action Plan on Sustainable Use of Plant Protection Products builds on prevailing plant protection legislation. A plant protection product approval and registration process that provides users with clear instructions on plant protection product management and use, sets out requirements regarding quality and safety of plant protection equipment, requires users to possess specialist knowledge on plant protection products, lists the supplementary provisions contained in the Plant Protection Act and the principles governing the implementation of good plant protection practice and other legal areas provides a very comprehensive legal framework.

The necessary minimum, particularly as regards the use of chemical plant protection products, lies at the core of the National Action Plan. The necessary minimum in the use of chemical plant protection products describes the frequency of their use that is needed to safeguard crops, especially as regards economic viability.

The decision of farmers, gardeners or foresters regarding the type and quantity of plant protection products needed to protect their crops in a given situation is not only dependent on statutory provisions. In particular, their decisions are based on a number of issues such as:

a) Prevailing agrarian-political and economic conditions:

- Participation in promotional programmes to improve the environment (such as agri-environment programmes)
- Production according to special agreements with the receiving side (e.g. sales agreements, contract cultivation, certification)
- Specific economic practices (e.g. organic farming)

b) Conditions arising from the adopted plant protection measures.

The aim of the National Action Plan is to further reduce the potential risks arising from the use of plant protection products.

In particular, the use of chemical plant protection products must be limited to the necessary minimum in order to avoid their unnecessary use and increase the use of non-chemical plant protection methods. The main focus of such measures is the promotion of innovation in plant protection and the further development of the integrated plant protection approach. This will be served by appropriate measures which are jointly implemented and funded by the federal and Länder governments.

The measures in question are designed to:

1. Minimise the risks to humans, animals and the natural environment which arise from the use of chemical plant protection products and reduce the quantities of plant protection products used. This involves:
 - = Significant reductions in the use of chemical plant protection products that are currently used to excess.
 - = Substituting a significant proportion of chemical plant protection methods with non-chemical methods.
2. Residues of plant protection products in domestic and imported agricultural products will be further reduced, making a key contribution to preventive consumer protection.
3. The economic situation for farms will be improved in that costs for unnecessary use of plant protection products will be avoided.

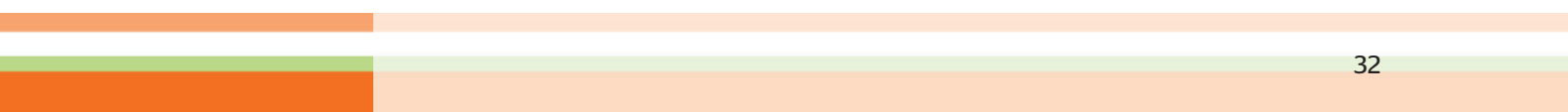
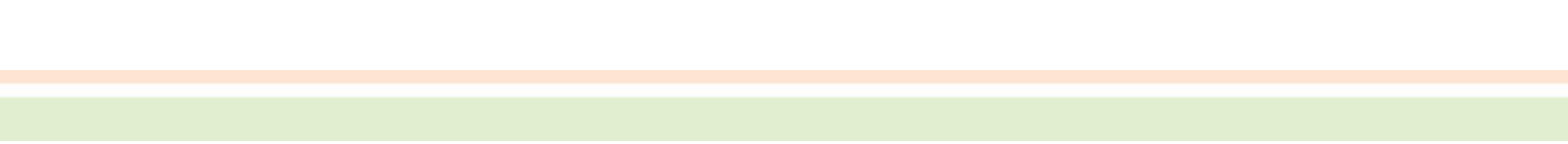
When it comes to implementing the package of measures contained in this National Action Plan, expert estimates assume that the risks to the natural environment arising from the use of plant protection products can be further reduced in the coming years. It can be expected that by 2020, the risk potential can be reduced by a further 25 percent. The calculations are based on the average figures for the period 1996 to 2005.

With the plan agreed by the Federal Ministry of Food, Agriculture and Consumer Protection, the Länder and the affected industry associations, various packages of measures will be adopted:

- Compliance with the necessary minimum when using plant protection products
- Development and promotion of innovations to foster integrated plant protection
- Improved knowledge and information
- Compliance with statutory plant protection provisions
- Reduction of plant protection product residues in food.

The National Action Plan is supported by the National Action Plan on Sustainable Use of Plant Protection Products Forum. Using the German Plant protection Index (PIX), attempts will be made to identify and illustrate trends in the frequency of plant protection product use, the associated risks posed to consumers and the environment, and thus to report on the progress made in implementing the plan.

The various funding options available in implementing the National Action Plan must be subject to in-depth evaluation.



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