

GOVERNMENT OF THE REPUBLIC OF SLOVENIA

**NATIONAL ACTION PROGRAMME  
TO ACHIEVE SUSTAINABLE USE OF PLANT PROTECTION  
PRODUCTS FOR THE PERIOD 2012–2022**

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## 1 INTRODUCTION

The principal task of Slovenian agriculture is the production of safe and quality food in such quantities to provide for an appropriate level of self-sufficiency in food in the Republic of Slovenia. Upgrading of the high technological, phytosanitary and veterinary as well as environmental-protection and animal-welfare standards in agriculture is thus necessary. The sustainable and efficient use of available production resources is the basis for ensuring food security, which means an adequate level of own long-term meeting of the needs for food, which may affect the stability and quality of food supply in Slovenia also in the conditions of the global market that is increasingly at risk.<sup>1</sup> Natural conditions in Slovenia are relatively disadvantageous for agriculture. Only limited surfaces are suitable for agriculture since more than 60% of the total surface is covered by forests. Less than 25% of the total surface is occupied by agricultural land; however, the proportion is still constantly decreasing as a result of overgrowing of the land, extension of building areas and the new transport infrastructure. About 75% of the farmland is situated in areas with the conditions disadvantageous for agriculture (climate, inclination of the terrain). In the structure of the agricultural land used, about 60% is represented by permanent grassland. About 35% of the total farmland is intended for the production of arable crops and vegetables, while 5% is covered by permanent crops where the consumption of plant protection products (hereinafter referred to as: PPP) is the most abundant. This means that about 10% of the Slovenian territory is potentially burdened by the use of PPP that aim at protecting cultivated plants against plant diseases, pests and weeds that cause economic damage in agriculture. In the structure of agricultural production, land under cultivation (fields and permanent crops) is particularly subjected to potential burdening, since the use of PPP is not permitted in forests and usually not necessary on the permanent grassland. However, since these 10% are situated mainly on a flat land or in the vicinity of water streams and other surface waters, or coincides with catchment areas or protected zones or settlements, due regard should be paid to decreasing the risk arising from the use of PPP.

Plant protection products are an important milestone in providing food production and self-sufficiency in food. They safeguard agricultural products by eliminating or reducing competition arising from undesirable plants (weeds) and attacks by harmful organisms and diseases. They also provide for the protection and appropriate quality of agricultural products, and decrease labour input. Thus, plant protection products play an essential role in the provision of food security and each year in ensuring reliable supplies of agricultural products. Moreover, PPP contribute to ensuring the availability of low-priced fruits and vegetables of good quality, which makes them affordable for all consumers. The use of plant protection products reduces the needs for agricultural land for the production of food and feed and enables production of a wider variety of food at the regional level, which can reduce transport costs and make more land available for other uses, e.g. amenity, natural parks and protection of biodiversity.

However, despite their advantages associated in particular with agriculture, plant protection products often have harmful impacts since they are released into the environment during use, which may lead to the exposure of humans and the environment.

In the Resolution on strategic guidelines for the development of the Slovenian agriculture and food technology by 2020 – 'Zagotovimo.si hrano za jutri' (Resolucija o strateških usmeritvah razvoja slovenskega kmetijstva in živilstva do leta 2020) – 'Zagotovimo.si hrano za jutri' (ReSURSKŽ), the following objectives of agricultural policy are provided for in compliance with the principles of sustainable development of agriculture:

- a) ensuring food security through a stable production of safe and quality food that is affordable for all consumers;
- b) enhancing the competitiveness of agriculture and food technology;
- c) sustainable use of production potentials and ensuring public goods associated with agriculture;
- č) ensuring the harmonious and socially sustainable rural development (in cooperation with other policies).

The Slovenian agricultural policy introduces multifunctional agriculture and will apply all sources available to support its sustainable development, which implies economically effective and competitive, socially responsible and also environmentally sound agriculture.<sup>i</sup> This includes also the sustainable protection of plants against various harmful organisms that cause unacceptable economic damage to producers or are even detrimental to the biological diversity<sup>ii</sup>, and result in the presence of micotoxins and other harmful substances in agricultural products<sup>iii</sup>; therefore, in the production of food and feed, such organisms are controlled by mechanical, biological and chemical means (PPP). Plants and plant products in international trade are also subject to biosafety standards<sup>iv</sup> in order to prevent the spread of harmful organisms from production areas to consumption areas, particularly when different continents are involved.<sup>v</sup>

Agricultural policy measures that are currently applied have supported, among others, the conversion of farms from conventional to integrated and organic farming, which emphasises the implementation of the principles of environmental protection, nature preservation and genetic conservation in agriculture. In 2011, 52% of wine-growers, 26% of field-crop growers, 80% of hop-growers, 70% of fruit growers and 65% of vegetable growers were included in integrated production, and 3.1% of all farm holdings, which apply the principles of good plant protection practice<sup>vi</sup>, were included in organic farming; thus the risk posed by the use of PPP is reduced considerably.

However, the maximum residue levels of PPP in food, feed and the environment are still exceeded, which requires a more thorough systemic approach to the integrated pest management (hereinafter referred to as: IPM) and the conversion of farm holdings from the existing conventional production to sustainable farming practices (e.g. organic or integrated).

The use of PPP in agriculture cannot be avoided due to the influences that plant harmful organisms have on cultivated plants. Climatic conditions which determine agricultural production as well as the conditions for the development of diseases and harmful organisms play a significant role in the open-air cultivation. A comparison of temperatures and average annual precipitation sums for certain places in Slovenia and selected European countries indicates that the Slovenian climate is the most humid. Precipitation is similar only in certain areas in North Italy. Precipitation levels are significantly lower in most production areas of European countries. Although the pace of development of individual species of harmful organisms usually depends on temperatures, which directly involves the intensity of plant protection, humidity of the climate or precipitation is an even more important factor that determines the intensity of PPP use. Abundant precipitation in the growing season enables more intensive development of certain pathogenic fungi, which is reflected in the increased use of fungicides and contributes to a greater total use of PPP<sup>ii</sup> despite their rational utilisation.

An increase in food production cannot be expected without intensifying the use of advanced technologies. Self-sufficiency in food in Slovenia can also not be increased without the use of PPP. The purpose of this document is to determine the objectives and orientations in relation to the reduction of risks resulting from the use of PPP by using new knowledge, technical development, introducing innovations, educating users, introducing and promoting IPM and thus increasing the effectiveness of PPP use and decreasing environmental burden. Therefore, we strive at producing enough food by sustainable use of PPP that is based on integrated pest management. Pesticides are regulated for the purposes of agricultural and non-agricultural use by means of the Plant Protection Products Act and Chemicals Act that governs biocidal products. In this document, the use of pesticides or plant protection products is discussed.

## **2 LEGAL BASIS FOR THE NATIONAL ACTION PROGRAMME**

The European Union started to systematically regulate the use of PPP at source, namely during PPP authorisation procedure, by issuing Council Directive 91/414/EEC concerning the placing of plant protection products on the market already in 1991, which specified the common tool and criteria for assessing the suitability of PPP in the EU area. A thorough system for evaluating the risks for human health and the environment resulting from the PPP use has been established over the years at the EU level. However, in spite of the existing legal

framework, certain PPP may still be found within the EU area in undesirable quantities in soil, water and in the wider environment. Agricultural products in the EU territory still contain residues that exceed the prescribed limitations. The reason is the phase of PPP use which is the basis for determining the total risk associated with PPP. Risks posed to the environment or human health can occur through direct exposure (farmers using such PPP) and indirect exposure (consumers, residents and bystanders), in particular during or after the use of PPP in agriculture and other activities.

For these reasons, Decision of the European Parliament and of the Council was adopted in EU in 2002 concerning the need for a further reduction of harmful impacts of PPP on human health and the environment. On the basis of this decision, **Thematic Strategy on the Sustainable Use of Pesticides** was adopted in 2002, providing for a number of measures for achieving the common objective of reducing the risks for human health and the environment resulting from the PPP use, and the use of pesticides.

One of the first measures to achieve the common objective was the new **Regulation on maximum residue levels of pesticides in or on food and feed of plant and animal origin** that was adopted in 2005; this Regulation replaced four directives and provided for new measures which contributed to limiting the risk for consumers at the end of the food chain. In order to reach the objectives of the strategy, Directive concerning the authorisation of PPP was revised and replaced by a new **Regulation concerning the placing of plant protection products on the market**.

It was not possible to include in the existing EU legislation all measures foreseen in the strategy; therefore, new regulations were prepared and also adopted in 2009, as follows: **Directive on the sustainable use of pesticides, Regulation concerning statistics on plant protection products** and **Directive on the certification of pesticide application equipment**, which completed the EU legislation necessary for the realisation of objectives of the Thematic Strategy on the Sustainable Use of Pesticides.

By means of the Plant Protection Products Act (2001) and further amendments and supplements and implementing regulations Slovenia implemented, in accordance with the applicable EU legislation: provisions concerning the regulation of the trade in active substances which are PPP and their control; authorisation of PPP; trade in PPP; use and control of PPP; PPP residues; keeping the register of PPP and the register of legal and natural persons engaged in the trade in PPP; information and keeping records in relation to PPP; and technical requirements in respect of the PPP application equipment. Additionally, regulations on chemicals provide for as follows: the production of chemicals necessary for the production of PPP and trade in such chemicals; good laboratory practice; prior informed consent procedure (PIC); persistent organic pollutants; classification, packing and labelling of PPP; and the control of PPP. Moreover, regulations on environmental protection regulate PPP wastes, PPP waste packaging and PPP imissions in the environment.

In this way, Slovenia decreased the risk resulting from the use of PPP disputable for humans and the environment; however, this did not offer solutions for all problems associated with the use of PPP. Inappropriate or excessive use of PPP may always imply adverse consequences for the environment and human health. Certain countries, such as Denmark, developed a plan for the reduced and sustainable use of PPP already in the second half of the 1980s by reason of evident irregularities and adverse effects of the industrial type of agricultural production.<sup>ii</sup> As already mentioned, in 2009, the European Parliament and the Council adopted a set of legal rules concerning the marketing and use of PPP. On 14 June 2011, Directives 79/117/EEC and 91/414/EEC were replaced by Regulation 1107/2009/EC concerning the placing of PPP on the market, which provides for a greater protection of humans, animals and the environment and clarifies the conditions that apply for PPP authorisation. The Regulation introduces additional exclusion criteria for active substances that are used in PPP. These conditions are related in particular to certain properties of substances, such as: carcinogenicity, developmental toxicity, mutagenicity, genotoxicity, persistence in the environment, bioaccumulation, etc. The Regulation also provides for the application of precautionary principle.

A legal basis for the National Action Plan, which is laid down in Directive 2009/128/EC of the European Parliament and of the Council establishing a framework for Community action to achieve the sustainable use of PPP, which has been transposed into the Slovenian law by the new Plant Protection Products Act (Official Gazette of the Republic of Slovenia, No 83/12), was also adopted at the EU level. The National Action Plan (hereinafter referred to as: NAP) that Slovenia, like other Member States, must adopt by the end of 2012, aim at setting targets, measures, timetables and indicators to reduce risks resulting from the use of PPP and impacts of such products on human health and the environment, with a special emphasis on integrated pest management and alternative plant protection approaches and techniques in order to reduce the use of PPP.

In its Article 4, Directive 2009/128/EC of the European Parliament and of the Council indicates that NAPs take into account plans under other Community legislation concerning the use of pesticides, such as measures planned under Directive 2000/60/EC.

### **3 USE OF PLANT PROTECTION PRODUCTS IN SLOVENIA**

Until the middle of last century, chemical substances that were used in plant protection were predominated by inorganic products based on sulphur, copper, zinc, and in the beginning also arsenic. With the development of chemical industry, numerous synthetic preparations were developed that enabled a sufficient control of harmful organisms. Knowledge of the impact of such chemical substances on humans and the environment could not keep up with their use;



thus, temporary and permanent adverse effects of such substances on the environment or even human poisoning were established later. The general environmental protection awareness was raised not earlier than in the 1980s of the 20<sup>th</sup> century and contributed to the changed non-critical attitude towards the use of PPP.<sup>ii</sup> At that time, the most dangerous products from the group of mercury and persistent organo-chlorine compounds, which were officially prohibited in the independent Slovenia in 1996, and other persistent compounds, for example herbicides belonging to the groups of triazine, chlorinated aliphatic compounds and benzoic compounds, were ceased to be used.<sup>vii</sup>

In Slovenia, older studies of PPP residues in the environment were conducted on agricultural products, in water or soil, where they appeared after the direct introduction on agricultural lands. As from 1973, the results of the monitoring of the use of PPP and of researches concerning their functioning in the environment suggested pollution due to the use of insecticides (chlorinated hydrocarbons, organic phosphoric esters and carbamates), fungicides (dithiocarbamates and metalaxyl)<sup>viii</sup> and herbicides from the group of triazines, chlorinated aliphatic compounds, benzoic compounds and phenoxy compounds (2,4-D, MCPA, 2,4,5-T).<sup>ix</sup>

Alignment of Slovenian legislation to the European Union legislation was pursued through the Plant Protection Products Act (Official Gazette of the Republic of Slovenia, No 11/01) which, on account of the residues found in waters, put restrictions to the use of multicomponent PPP based on atrazine within the safeguard zones of water resources or prohibited their use in areas where data on the monitoring of pesticides in drinking water and drinking water sources, springs, groundwater and in soil indicated that the permitted maximum levels of atrazine or its metabolites, as well as breakdown and reaction products in drinking water, were exceeded.<sup>x</sup> The authorisation procedure as provided for in the Plant Protection Products Act (2001) followed three key aspects of scientific evaluations of every active substance, as follows: to be safe (harmless to human health in direct or indirect contact), specific (effective to control specified harmful organisms, acceptable for non-target organisms) and non-persistent (to break down into simple chemical substances without any harmful impacts on the environment). Old active substances were re-evaluated and dangerous substances were removed from service. Authorisations for certain PPP are awarded for a maximum of ten years and may be extended several times, as appropriate. If on the basis of technical and scientific evidence there is reasonable ground for suspicion that a certain PPP which has already been authorised constitutes a danger to human health and the environment, the minister competent for agriculture has the power to restrict or prohibit the use of such PPP, as has already been the case on several occasions of water pollution and honey-bee poisoning.

At the European Union level, the area of PPP is regulated also by the legislation which governs water protection. Directives that are important for this area are as follows: [Framework Water Directive](#) (2000/60/EC) and its daughter directives: [Groundwater Directive](#) (2006/118/EC) and [Directive on Environmental Quality Standards in the Field of Water](#)

[Policy](#) (2008/105/EC). The alignment of national legislation to the requirements of the European Union was realised by the adoption of two decrees that established the criteria for achieving the objectives of the Framework Water Directive (2000/60/EC), namely: Decree on Surface Water Status (Official Gazette of the Republic of Slovenia, Nos 14/09 and 98/10) and Decree on Groundwater Status (Official Gazette of the Republic of Slovenia, Nos 25/09 and 68/12). Both regulations lay down environmental quality standards in respect of individual pollutants or groups of pollutants, presenting a significant risk to or via the aquatic environment, including such risks to waters used for the abstraction of drinking water.

As from 2001, according to the Slovenian Plant Protection Products Act, all PPP users must undergo a compulsory training (purchasing of PPP is not possible without having passed an examination in phytomedicine and without a certificate of knowledge in phytomedicine (hereinafter referred to as: certificate)), and equipment for the application of PPP to plants must be inspected. Upgrading of the plant protection prognostic service in 1997 contributed to improved accuracy of the forecast of critical periods for the protection of principal plants in the production and facilitated access to information for producers.

All measures taken have been oriented into the awareness-raising of users concerning the proper use of PPP, with emphasis on the protection of groundwaters and surface waters, protection of honey-bees, safe disposal of wastes and waste packaging of PPP. Encouragement of integrated and organic farming by the agricultural policy further contributed to the testing of biological control and other non-chemical methods, where these were available, as well as to advising to use PPP that were less harmful, less persistent and readily degradable, and to a better application of such products.

According to data, in 1995, 1,130 ha which represented at that time almost one quarter of all intensive orchards were already included in the Slovenian integrated fruit production (SIPS), which also comprised PPP application by means of low-volume spraying and low-drift nozzles. Of all producers, 93% of fruit-growers were equipped with sprayers that satisfied technical requirements. Of these, 2/3 of private fruit-growers were using low-volume spraying equipment, while on fruit plantations, this percentage amounted to 87%.<sup>xi</sup>

After payments have been introduced for the more environmentally-acceptable production methods in 2011, the proportion of intensive plantations included in the integrated production reached 56.51%, and 2.25% ha were included in the certified organic farming (Table 1). The basis of integrated pest management and the selection of environment- and consumer-friendly PPP constituted the foundation for the integrated production in fruit-growing, vegetable cultivation, wine-growing and arable farming, which is recognised in Slovenia as a high-quality production and identified as such also when placing certain products on the market (fruits and vegetables).

**Table 1:** The volume (ha) of integrated and organic farming in fruit-growing, vegetable cultivation, wine-growing and arable farming in 2011

	conventional (ha)	integrated (ha)	IP/conv. (%)	organic (ha)	org./conv. (%)
fruit-growing	4.942,00	3.451,43	69,84	193,03	3,91
vegetable-growing	1.497,00	977,06	65,27	147,69	9,87
wine-growing	16.351,00	8.581,40	52,48	287,19	1,76
arable farming	176.000,00	46.298,03	26,31	2399,99	1,36

Source: MAE

Slovenia differs from other European countries as regards PPP consumption due to its typical climate conditions as well as the conditions for and types of production. In Europe, the highest quantities of PPP sold fall to herbicides (42%) and then fungicides (39%). In Slovenia, the first place is occupied by fungicides (67%), which are followed by herbicides (24%) and insecticides (7%). However, it should be pointed out that 35% of all PPP sold are inorganic PPP – sulphur and copper.

The use of PPP in Slovenia has fallen almost by half over the last 20 years: in 2010, according to data by SEA<sup>1</sup>, it amounted to 1,134 tons and in 1992 to 2,031 tons. Concerning the structure of PPP use, it is encouraging that less harmful products prevail. More than one half of the quantity of fungicides used belongs to PPP based on copper and sulphur, more than one third of herbicides are PPP based on glyphosate, and more than one half of insecticides are PPP based on mineral oils which may be used also in organic farming.

**Table 2:** Sale of PPP in Slovenia in 2010

PPP GROUP	SUB-GROUPS	SALE (T)	PROPORTION (%)
<b>INSECTICIDES</b>	insecticides based on pyrethroids	0,5	0,0
	insecticides based on chlorinated hydrocarbons	0,2	0,0
	insecticides based on carbamates	3	0,3
	insecticides based on organophosphorous compounds	7	0,6
	other insecticides	51	4,5
	<b>INSECTICIDES TOTAL</b>	<b>62</b>	<b>5,5</b>
<b>FUNGICIDES</b>	fungicides inorganic based on copper compounds	52	4,6
	other inorganic fungicides	405	35,7
	fungicides based on dithiocarbamates	154	13,6
	fungicides based on benzimidazoles	375	33,1
	fungicides based on diazoles and triazoles	9,5	0,8
	fungicides based on diazines and morpholines	7	0,6
	other fungicides	161	14,2

<sup>1</sup> [http://kazalci.arso.gov.si/?data=group&group\\_id=6](http://kazalci.arso.gov.si/?data=group&group_id=6)

	<b>FUNGICIDES TOTAL</b>	<b>789</b>	69,6
<b>HERBICIDES</b>	herbicides based on phenoxy-phytohormones	16	1,4
	herbicides based on triazines	24	2,1
	herbicides based on amides	76	6,7
	herbicides based on carbamates	8	0,7
	herbicides based on dinitroaniline derivatives	8	0,7
	herbicides based on derivatives of urea	7	0,6
	other herbicides	115	10,1
	herbicides plant growth regulators	0,4	0,0
	<b>HERBICIDES TOTAL</b>	<b>254</b>	<b>22,4</b>
<b>OTHER</b>	<b>OTHER TOTAL</b>	<b>29</b>	2,6
<b>TOTAL</b>		<b>1.134</b>	<b>100</b>

Source: Phytosanitary Administration of the Republic of Slovenia, 2011

As a result of a new more comprehensive revision of active substances of PPP, the number of active substances permitted has fallen almost by half over the last 10 years (before revision: 1,000 active substances, after revision: less than 500 active substances) on the EU market. The principal criterion was the risk to human health and the environment.

## 4 OBJECTIVES

### General objectives of NAP are:

- to minimise the hazards and risks to human and animal health and the environment from the use of PPP, including through substitution of the most dangerous substances with safer (including non-chemical) alternatives;
- to reduce the levels of harmful active substances in food and drinking waters, including through substituting the most dangerous with safer (including non-chemical) alternatives;
- to encourage agricultural production so that PPP are used according to the principles of integrated pest management only when absolutely necessary or economically justified, in particular by raising users' awareness of the safe use of PPP, by promoting development and introduction of organic farming and other sustainable agricultural practices;
- to develop a transparent system for reporting and monitoring the progress made in the achievement of the objectives of the strategy including the development of suitable indicators;
- to ensure sustainable use of PPP for all plant species along with minimising the risks from the use of PPP.

**The specific objectives of NAP are:**

- to minimize the use of PPP (in particular PPP that contain active substances which, when subject to renewal of approval under Regulation (EC) No 1107/2009, will not fulfil the criteria relevant for approval laid down in paragraphs 3.6 to 3.8 of Annex II of that Regulation;
- technically justified use of PPP, which should be based on the improvement of technological procedures in the production of cultivated plants, with the assistance of the monitoring and forecasting service;
- to improve professional competence of users;
- to decrease PPP residues in Slovenian products; MRL should not be exceeded in any of such products;
- to decrease contamination of surface and groundwaters resulting from the use of PPP from the viewpoint of achieving environmental objectives for surface waters in accordance with regulations that govern the status of surface waters, and for groundwater in accordance with regulations that govern the status of groundwaters;
- to improve the control of the use of PPP (for agricultural and non-agricultural purposes) and of the disposal of PPP waste packaging;
- to establish a systematic monitoring of the impacts of PPP on certain non-target organisms, systematic monitoring of the poisoning of honey-bees, birds and fish, minimise the number of poisoned honey-bees, birds and fish resulting from the use of PPP;
- to establish a systematic monitoring of the impacts of PPP on the health of the users of such products.

In selecting the measures to achieve NAP objectives, economic, social, environmental and health impacts, as well as the current economic and financial crisis have been considered; therefore, the systems and policy have been applied which have already been established in the field of agriculture. Non-chemical measures which are preferred in the integrated and organic farming are usually more expensive or less effective than chemical measures. Therefore, in order to achieve the objectives and at the same time maintain the competitiveness of food production, due regard should be given to how is this manifested in the production economics, which requires a comprehensive economic analysis.

Measures directly associated with the use of PPP at the level of an agricultural holding include the basic principles of integrated pest management as referred to in Annex III to Directive 128/2009. For this purpose, the competent institutions provide all tools, information and advice available for the strict application of the basic principles.

## 5 MEASURES TO ACHIEVE NAP OBJECTIVES

### 5.1 TRAINING, SALES OF PPP, INFORMATION AND AWARENESS-RAISING

#### 5.1.1 Professional training

In Slovenia, a system for the training of users and distributors of PPP, including lecturers, was set up already in 2001 and has been performed in accordance with [Rules on professional training and assessment of knowledge in phytomedicine](#) (Official Gazette of the Republic of Slovenia, Nos 36/02, 41/04, 17/05, 92/06 and 99/08). Based on the records of trainings, in Slovenia the certificates of competence have been issued to about 65,000 users and distributors, including vendors of PPP, of which about 63,000 operators, 690 vendors, 470 responsible persons, 120 lecturers.

The existing training system in phytomedicine is divided into the following groups: training of responsible persons and lecturers in phytomedicine and training of operators and vendors. The groups differ in their duration, purpose and partially in training subjects. When establishing the training, the key subjects were related to plant protection, to the use of PPP and legislation in the field. The training was not brought fully into line with the legislation valid at that time; therefore, in 2009, the training material was amended by focusing on the impacts of PPP on the environment and human health. Other components of the training structure, including lecturers, were not amended. The existing material includes the following subjects: pathogenic agents and plant harmful organisms and the influence of weeds, impacts of PPP on human health and the environment, including PPP application techniques and legislation. Considering the requirements laid down in Directive 128/2009/EC, the relevant subjects will need to be further adjusted and extended.

Based on Directive 128/2009/EC, the existing system has been amended in particularly in the part that refers to the training and persons who should be subjected to the training. Under the new system, advisers of the Agricultural Consultancy Public Service with the Chamber of Agriculture and Forestry of Slovenia who provide advice on the use of PPP, will have to attend training courses and obtain and renew training certificates in relation to PPP, which is also stipulated by the new Plant Protection Products Act (Official Gazette of the Republic of Slovenia, No 83/12).

#### **Major deficiencies of the present system are as follows:**

- the training has not been brought fully into line with the requirements of Directive 128/2009/EC; the main deficiency is the absence of plant protection based on the basic principles of IPM;

- the present lecturers do not provide a sufficient professional coverage for the entire training subject; this refers in particular to the requirements in relation to the impacts on human health and the environment;
- certain groups of people were granted training certificates on the basis of education (syllabuses of education institutions do not cover the entire subject matter of Directive 128/2009/EC);
- training is not required for field advisors (CAFS advisors, advisors of companies engaged in PPP).

**Key novelties and changes of the existing system:**

- new training material must be prepared, to include all subject matters as prescribed by Directive 128/2009/EC;
- considering the new subject matters and targets of the training, no exceptions to the training will be allowed;
- all advisors and vendors will have to undertake the training with no regard to the purpose of advising, when such advising is related also to the use of PPP.

***Measure 1: Administration responsible for plant protection products will provide for the substantive upgrading of the existing training system, with particular attention on minimising the adverse effects of PPP on human health and the environment and promoting the use of non-chemical methods.***

The administration responsible for PPP (hereinafter referred to as: Administration) prepares new material for the training in phytomedicine which includes all components of Annex II of Directive 128/2009/EC. The material includes the following chapters: plant protection under the basic principles of IPM; demonstration of the use of application equipment, including calibration at the level of agricultural holdings; impacts on the environment, by emphasising the risk to birds, mammals, honey-bees, groundwaters and surface waters, paying special attention to the methods for minimising the risk, and health section which includes the risk to operators, agricultural workers and humans through diet.

The new contents are taken into account in the training of operators, vendors and advisors. Special attention should be devoted to advisors who provide advice in relation to plant protection against harmful organisms. The training should be adjusted to individual groups of attendants.

### **5.1.2 Trade in PPP and their sale**

In Slovenia, the system for the sale of PPP enables users to buy PPP in two different ways: without presenting the certificate or by presenting the certificate. On 7 May 2012, 56 products were authorised (21 active substances) that may be bought without presenting such a certificate. Distributors who are legal and natural persons and who are responsible for placing PPP on the market, including wholesale traders, retail traders, vendors and suppliers, are engaged in the trade in and sale of PPP. They must fulfil the conditions as to education and professional training of the personnel, premises and equipment, and must be issued authorisations by the Administration to perform such activity. Distributors selling PPP in florists' shops and retail stores with non-food goods must fulfil the conditions and obtain authorisations from the ministry.

Authorisations for carrying out the trade in PPP are issued by the Administration based on the records of a competent inspector concerning meeting the conditions by premises, equipment and personnel for carrying out the trade in PPP. The Administration keeps a register of PPP distributors. The Administration communicates data concerning the trade in PPP to the Statistical Office of the Republic of Slovenia, with a view to collecting and processing statistical data on the trade in PPP.

At the present moment, 400 distributors have been registered for the trade in PPP, who also provide advice on their use, which usually concerns the use of products included in their sales programmes.

***Measure 2: The current system of PPP sales remains in force. PPP are marketed only by legal entities that employ qualified persons who meet all the conditions that apply for entry in the register of distributors. In addition to PPP, distributors sell also appropriate protective equipment for users, provide information as regards the safe use of PPP and alternative pest control methods (diseases, harmful organisms and weeds) in accordance with the forecasts of the monitoring and forecasting service and the basic principles of integrated pest management.***

### **5.1.3 Public information and awareness-raising**

At the moment, public information and awareness-raising is not regulated by an appropriate legal basis. Various activities are undertaken by the competent ministry to tackle problems concerning the safe use of PPP, use of PPP which presents the risk to honey-bees, identification of fake PPP, proper handling of waste PPP which contain dangerous substances, etc. The activities of informing and raising awareness of PPP users and the general public should be upgraded accordingly, in order to raise the awareness of the risk posed by the use of PPP, by focusing on the improper use of PPP and improper handling of PPP packaging and residues.



Handling of waste PPP which contain dangerous substances has already been governed by a regulation that lays down the obligations of persons who deliver or supply PPP packed for final use directly to final users, informing purchasers on the free delivery of waste PPP at sales points or at collection points for waste PPP. The obligation of informing final users has also been imposed on the collectors of waste PPP, who must inform final users of the purpose and aims of collecting waste PPP, proper handling of PPP, the possibilities of free delivery, as well as of the methods for recovery and disposal of PPP. In the new Plant Protection Products Act, information and awareness-raising of users is stipulated in such a way that the ministry adopts the information and awareness-raising programme in relation to PPP, which includes measures to promote and facilitate information and awareness-raising of the public concerning the impacts of PPP use and the impacts of improper handling of waste PPP that contain substances dangerous to human health, non-target organisms and the environment. The public is informed of the risks and the potential acute and chronic effects for human health, non-target organisms and the environment arising from the use of PPP. Moreover, provisions have been made for gathering data and information on PPP acute poisoning incidents, as well as potential developments of chronic poisoning with such products.

Interested public participates in the preparation of the programme.

***Measure 3: The Administration adopts the information and awareness-raising programme on PPP. The public information programme includes also information on pesticide acute poisoning incidents, as well as chronic poisoning developments, where available, among groups that may be exposed regularly to pesticides such as operators, agricultural workers or persons living close to pesticide application areas.***

#### **5.1.4 Updates of instructions on the handling of waste PPP that contain dangerous substances, and their packaging**

Improper handling of waste PPP that contain dangerous substances, or their packaging, may result in adverse impacts on the environment and consequently in greater risks to animals and the pollution of soil, water (in particular groundwater) or air.

Waste PPP that contain dangerous substances are unserviceable PPP and their residues, which remain in the waste sales packaging after use. Rules of conduct to apply to such waste are stipulated by legislation in the field of wastes. In the part addressing the duties of PPP users concerning the handling of waste PPP that contain dangerous substances before delivery of such waste PPP under relevant regulations, legislation in the field of wastes is modified by the rules on the duties and obligations of PPP users.

***Measure 4: In cooperation with the stakeholders from the field of PPP sales and directorate competent for the environment, the Administration provides for the modification of***

*guidelines to users and distributors of PPP for handling of waste PPP that contain dangerous substances, and their packaging.*

*The guidelines are available to all users and purchasers of PPP, training participants and owners of the spraying equipment.*

### **5.1.5 Authorisation of PPP**

PPP are authorised on the basis of applications lodged by applicants, usually producers/distributors of PPP. Risk assessment is the key component of authorisation procedure. The assessment is carried out by PARS, together with authorised institutions. The reasons for authorisation usually depend on the economics of an individual PPP, meaning the intended use. In this respect, it should be underlined that PPP that belong to the group of substances which involve minor risks (pheromone traps, substances used for human and animal consumption, etc.) or to PPP based on microorganisms and viruses, are usually less frequent and also less frequently used by users, which implies their insufficient economic coverage.

***Measure 5:** Investors who lodge applications for the authorisation of PPP that belong to the group of substances that pose low risk to the environment and human health (pheromone traps, biological control agents, PPP based on basic substances and low-risk PPP) are encouraged through lower fees imposed.*

*The Administration strictly takes into account new scientific knowledge on the impacts of PPP on human health and the environment in accordance with Regulation 1107/2009/EC and thus eliminates PPP that involve unacceptable impacts.*

*The Government lays down fees for the low-risk PPP.*

### **5.1. 6 Training in plant protection within the scope of the measure of agri-environmental payments (hereinafter referred to as: AEP)**

To be able to use PPP, PPP users must, in addition to compulsory education, undertake also a certain volume of trainings, if such users are included in the measure of agri-environmental payments within the scope of the Common Agricultural Policy (hereinafter referred to as: CAP). It should be verified whether the contents of the training in IPM, contents relating to the protection of human health and the environment and waste management that result from the use of PPP, may be included in the CAP training contents.

***Measure 6:*** *The Ministry supplements AEP training programmes with the contents on integrated pest management, protection of human health and the environment and includes in these programmes also contents on the water management plan.*

### **5.1.7 Protection of non-target arthropods and honey-bees**

The protection of non-target arthropods and honey-bees is necessary. The existing practices laid down by regulations do not provide for a level desired for the protection of non-target organisms; therefore, similar questions arise at each honey-bee poisoning incident. By strengthening safety measures, honey-bee poisoning and consequently also adverse effects on other non-target arthropods would be prevented.

***Measure 7:*** *The minister issues a regulation, laying down the requirements intended to PPP users concerning the proper use of PPP, with a view to prevent adverse effects on honey-bees, other non-target arthropods and other wild animals.*

*The Ministry prepares, together with the Administration and in cooperation with the stakeholders, a code of good agricultural and beekeeping practice that will signify the minimum risk possible for honey-bees in the agricultural environment (e.g. water access, avoiding placing beehives in the vicinity of critical spraying points, dialogue with agricultural producers).*

*Within the framework of the integrated rural development (hereinafter referred to as: IRD), researches of the impacts of PPP on honey-bees are encouraged in order to protect the Carniola bee (kranjska čebela) (*Apis mellifera carnica*).*

## **5.2 MEASURES IN THE FIELD OF HUMAN HEALTH**

### **5.2.1 Exposure of operators, agricultural workers and bystanders**

Human exposure to adverse effects of PPP may take several forms. Workers in the production of PPP and users of such products are subjected to the highest exposure. However, workers who access treated surfaces and people living near agricultural and non-agricultural lands may also be indirectly exposed to PPP.

***Measure 8:*** *The Ministry lays down the PPP use regime in the areas that are located in the direct vicinity or within the inhabited areas.*

*In the spatial management guidelines, the Ministry includes instructions for the use of PPP within inhabited areas.*

*Users and workers must have access to protective equipment.*

*Users must be familiar with the measures aiming at reducing drift of pesticide mixtures to the neighbouring surfaces.*

### **5.2.2 Human exposure through diet**

Humans may be exposed to PPP residues through diet, including drinking water. The impacts on humans may be acute and chronic. The limit values that do not present risk for humans are laid down by regulations from the field of pesticide residues in food and drinking water. Nevertheless, every effort should be made to achieve minimum PPP residue contents in food and drinking water and thus prevent any human exposure whatsoever.

***Measure 9: Agricultural practices are encouraged (organic and integrated farming and other schemes), which are proven to have effect on the reduction of PPP residues in food, drinking water and the environment.***

*A system should be established to keep the public strictly informed of data on the contents of PPP residues in food produced in different ways and analysed in monitoring procedures.*

## **5.3 PPP APPLICATION EQUIPMENT**

### **5.3.1 Inspection of the equipment in use**

Regular inspections of tractor-drawn or self-propelled equipment for the surface application of PPP (sprayers) and tractor-drawn or self-propelled equipment for the spatial application of PPP (sprinklers) are governed by three regulations, on the basis of which the equipment inspected is attached by control labels indicating its proper operation:

- Rules concerning the granting of the conformity certificate with regard to devices intended for the application of plant protection products for new equipment;
- Rules concerning the conditions and procedures to be met and followed by supervisory bodies authorised to carry out regular examinations of application equipment for plant protection products in order to obtain MAE authorisations;
- Rules concerning the contents and mode of keeping the register of application equipment of certified types that have been the subject of successful or unsuccessful regular control.

Each year in April, before the start of the spraying season, organisations authorised to carry out inspections of the PPP application equipment organise in-the-field inspections. Users of the spraying equipment must have their PPP application equipment tested every 3 years.

***Measure 10: The Administration will upgrade the existing inspection system for the PPP application equipment (further training for equipment inspectors, control of equipment inspectors, modern inspection methods and equipment that complies with the standards).***

*The training of users includes practical presentation of calibration and equipment inspection before PPP application.*

### **5.3.2 Introduction of improved techniques for the application of PPP**

PPP users must be acquainted with the general principles of good agricultural practice. Before choosing the surface to be treated, each user must consider the possibilities of spray drift and carry out the PPP application in such a manner as to prevent PPP spray drift to the neighbouring surfaces. If a user decides to grow a certain plant on a surface where the possibilities for spray drift from the neighbouring surfaces are high, such user must take over the risk. Supervisory organisations must not allow any residues of unauthorised PPP in agricultural products, irrespective of whether these result from the PPP spray drift from the neighbouring surfaces or from improper use by the user.

Improved PPP application techniques contribute particularly to a better coverage of the treated surface, and thus improve the effectiveness and reduce spray drift of such substances outside the application area during application. Direct spray drift that results from the movement of air flows during the treatment should be minimised. With the application of nozzles of different types, with different flow rates or pressure, the liquid spray mixture forms drops of certain sizes, which are transferred to the target surface by air pressure. The extent of spray drift depends considerably on the size of drops and forces to which such drops are subjected on their way towards the biological target. Spray drift of a pesticide mixture after application as a result of chemical processes and atmospheric phenomena that occur after the application may be influenced by users particularly through selecting a proper time for PPP application (e.g. appropriate temperature, moisture, wind).<sup>xii</sup>

***Measure 11: The Ministry will encourage the purchase of new equipment for PPP application and seed disinfection by means of PPP which fulfils the requirements concerning PPP spray drift reduction and uniform dispersion of PPP on the seeds.***

*The option of incentives for upgrading the existing equipment by using appropriate nozzles to reduce spray drift are to be considered.*

*The Administration prepares regulations to provide for an appropriate classification of the machinery and equipment in terms of technical possibilities for reducing spray drift into basic spray-drift reduction classes.*

Low-drift nozzles (anti-drift nozzles) reduce spray drift (from 50-90%) (various types reduce the necessary distances from non-cultivated surfaces by e.g. 30–75%). However, in such case, there is no guarantee for the quality of PPP application on the biological target to be maintained. Spray drift may also be reduced by means of appropriate sprinklers or sprayers,

which may result in 75-90% lower PPP spray drift by using low-drift nozzles and airlocks, taking account of ecological and weather conditions during application and using various PPP application techniques. Experts may develop an appropriate application quality and minimum spray drift of the pesticide mixture by applying an appropriate combination of water consumption for spraying or sprinkling, running speed and air flow-rate or pressure in the device. However, the systems for testing and developing the PPP application technique in Slovenia have never gone further than a small number of researches and tests for certain production types (e.g. fruit-growing, hop-growing, maize production). Methods that should be promoted and financially supported in the research and demonstration centres would be aiming at introducing methods in respect of certain types of agricultural production and kind of PPP application to reduce PPP drift outside the target production surfaces by using PPP application equipment which enables reduced PPP drift, by using low-drift nozzles and by combining other measures for the reduction of drift, or by adjusting operational parameters when using standard (classic) nozzles.

***Measure 12: The Ministry will, within the framework of IRD, provide support to research projects that involve research and development in the field of PPP application quality by means of low-drift equipment, by using low-drift nozzles (anti-drift nozzles), and by adjusting spraying operational parameters when using standard nozzles, thus drawing up a list of appropriate PPP application equipment and low-drift nozzles (anti-drift nozzles).***

## **5.4 SPECIAL PRACTICES**

### **5.4.1 Aerial spraying**

Due to the fragmentation of agricultural surfaces and settlement pattern in Slovenia, safe treatment with PPP by avoiding drifting of such products onto houses, humans and animals is not possible; therefore, aerial PPP application or aerial spraying has not been permitted so far.

***Measure 13: The prohibition of aerial spraying in Slovenia remains in force.***

### **5.4.2 Protection of the aquatic environment and drinking water**

Protection of the aquatic environment and drinking water sources in the Republic of Slovenia is regulated by the Waters Act (Official Gazette of the Republic of Slovenia, Nos 67/02 and 57/08), which governs the management of waters and the management of water and waterside land, which comprises the protection of waters, the regulation of waters and decision-making on the use of waters.

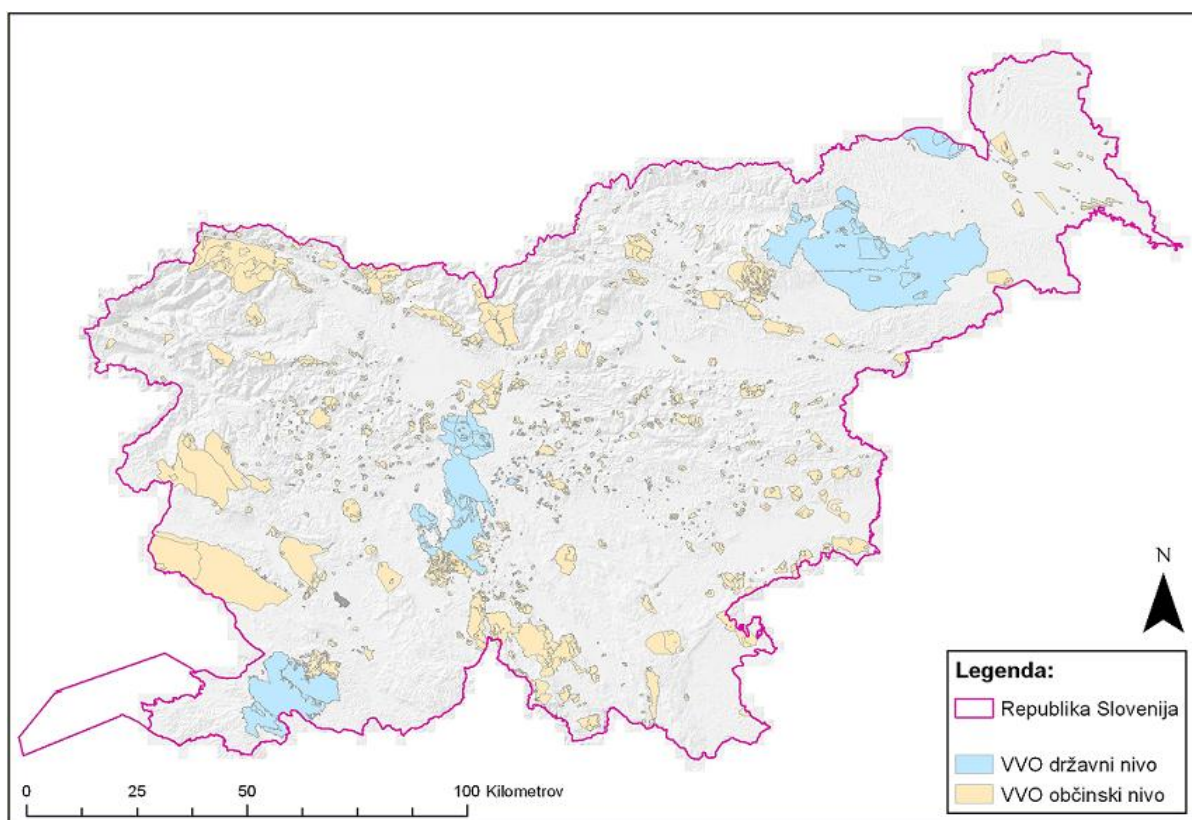
The Waters Act serves to transpose into Slovenian law the requirements of Directive of the European Parliament and of the Council 2000/60/EC establishing a framework for

Community action in the field of water policy. This Directive provides for that Member States should identify water bodies that are or will be used for the drinking water supply and that provide more than 10 m<sup>3</sup> a day or serving more than 50 persons, and establish safeguard zones for those bodies of water.

According to data of the Slovenian Environment Agency, in Slovenia water protection zones (hereinafter referred to as: WPZ) occupy less than 345,000 ha or 17% of the entire territory.

The PPP use regime in water protection zones is stipulated by regulations that govern water protection zones. On the basis of the Waters Act, 9 WPZ decrees have been adopted so far; in addition to these, WPZs laid down by municipal ordinances are still valid.

**Image1:** Water protection zones in Slovenia – national and municipal level



Source: MAE, Service for the Register of Agricultural Holdings, May 2012

Various levels of protection are determined in the water protection zone. The most rigorous protection regime applies in inner water protection zones (WPZ I). PPP that may be used in the WPZ I are only the preparations, which do not contain [active substances that are banned to be used in inner water protection zones](#). The list of prohibited active substances is published on the web page of the Ministry of Agriculture and the Environment. On surfaces located within middle water protection zones (WPZ II) and outer water protection zones (WPZ III) PPP may be used only in accordance with technological instructions for the integrated production.

The decrees stipulate also additional conditions that must be respected while carrying out pest management on agricultural lands within inner WPZ. It should be pointed out that the use of PPP must be applied only as a supplementary measure to other non-chemical plant protection measures, which may be mechanical, biological and biotechnical measures. Priority is given to chemical measures and the use of PPP that are authorised to be used in accordance with regulations that govern organic farming.

The Waters Act provides also for the total prohibition of the use of PPP on waterside land in the layout width of 15 m of the boundary of the bank, for class 1 waters, and 5 m from the boundary of the bank for class 2 waters, in order to protect surface waters.

Moreover, the applicable legislation from the field of PPP authorisation also includes the conditions that refer to the protection of ground and surface waters and the protection of aquatic organisms, which must be complied with by a certain product to be placed on the market in the Republic of Slovenia. The content of PPP in groundwater is decreasing; however, in certain flat-land areas in Slovenia (Drava and Mura basins) with the intensive agricultural activity, certain PPP exceed the quality standard. In surface waters, the concentration and content of various PPP change over the years. Although the concentration of certain PPP decreases, new active substances occur that exceed quality standards, whereby the most problematic being Mura, Drava and Savinja river basins.

The Water Management Plan for the Danube and Adriatic Sea water zones (hereinafter referred to as: WMP) was adopted on the basis of the Framework Water Directive. Based on the determination of properties of water areas and the situation, management objectives in the field of water protection and regulation as well as water use are specified in the WMP, in order that the good water condition be achieved by 2015.

The Programme of Water Management Measures 2011–2015 which includes basic and supplementary measures is also a part of WMP. The programme of basic measures consists of the common water policy measures, which are provided for by regulations that served to transpose into Slovenian law provisions of the [Framework Water Directive](#) (2000/60/EC), and directives, indicated in Annex VI of the Framework Water Directive (2000/60/EC), as well as other basic measures that are provided for by the Slovenian legislation, namely basic measures for the area of economics, use, management and protection of waters. Water bodies of surface and groundwaters in respect of which environmental goals will not be reached by 2015 without taking supplementary measures, are foreseen to be subject to supplementary measures with the aim to achieve good water condition or good water potential. Supplementary measures are also foreseen for all water bodies of surface and groundwaters with a view to prevent deterioration in the status. They include measures for a wise use of waters. Moreover, supplementary measures associated with economic instruments and climate changes have also been developed, as well as other supplementary measures which refer



mostly to recommendations to supplement legal and administrative procedures and to research and developmental measures.

Considering the use of PPP, a recommendation for a supplemental measure is included in the Programme of Water Management Measures 2011–2015, which foresees that measures should be focused on local circumstances and problems in the areas where a poor condition of surface and groundwaters has been detected on account of PPP. The measure includes a proposal for the review of the farming practice applied in these areas and of the kinds of products used thereby. Considering the risks established, suitable alternatives for the existing farming practice should be developed, when necessary, and appropriate training be executed in order to apply such alternatives.

***Measure 14:*** *When preparing RDP 2014–2020, the Ministry includes, within the framework of the measure of agri-environmental payments, with the cooperation of professional services for plant protection and the environment, measures in the field of protection of the aquatic environment and drinking water resources.*

***Measure 15:*** *Whenever a user has two or more PPP available with the same or similar effectiveness, the user gives preference to the product that has less harmful impacts on surface and groundwaters and does not contain active substances from the list of priority substances or special pollutants provided for by the regulations that govern surface waters' status.*

#### **5.4.3 Reduction of PPP use or risks resulting from their use or prohibition of their use in specific areas**

To avoid any possible risks for human health, the use of PPP should be limited or fully prohibited on non-agricultural surfaces and in public areas, where the safe use of such products may not be ensured by means of professional operators or, where possible, use alternative methods to control harmful organisms. The eventual exposure of humans on public areas, who could be subject to the risk arising from PPP application must also be taken into account.

***Measure 16:*** *The Ministry lays down limitations to the use of PPP in public areas.*

*In this respect, it should consider the use of non-chemical methods, in particular the possibility of mechanical pest control and biological plant protection. On non-agricultural surfaces, such as road verges or railways, the possibility and economy of pest control is verified by means of non-chemical methods (e.g. use of water vapour and similar).*

*At sports playgrounds, the use of PPP should be limited only to point use, if the use of such products is necessary. In such case, the minimum exposure should be ensured to humans*

*who are present at such playgrounds after the PPP application. Following a preliminary estimation of urgency of the measure, PPP may be exceptionally used on the whole surface.*

## **6 MEASURES IN THE FIELD OF AGRICULTURAL PRODUCTION**

### **6.1 INTEGRATED PEST MANAGEMENT**

The general principles of integrated pest management are laid down in Annex III of Directive 2009/128/EC, which establishes a framework for Community action to achieve the sustainable use of PPP. In their action plans, EU Member States should describe the activities and methods to implement individual principles and requirements referred to in the said Annex. Considering the new obligation imposed on Member States to establish a system of integrated pest management in accordance with provisions of Directive 128/2009/EC, integrated pest management becomes a common agricultural practice.

In Slovenia, certain requirements of Directive 128/2009/EC have already been transposed by legislation from the phytosanitary field. In this respect, the Plant Health Act has already regulated monitoring, observation and prediction of the occurrence of harmful organisms, provision of the equipment necessary for such an activity, advising and information in relation to the protection of plants against harmful organisms, which has not recently been regulated by EU regulations and was subject to different regulations at the level of individual Member States. These activities are determined in ZZVR-1 as obligations of the plant health public service and in the Agriculture Act as activities of the agricultural consultancy public services. In Slovenia, integrated pest management under provisions of Directive 128/2009/EC coincides to a large extent with the motion of integrated production or integrated method of agricultural production, which has so far not been subject to any EU regulation and is regulated differently at the level of individual Member States.

Integrated pest management signifies a combination of agri-technical measures and plant protection measures against harmful organisms. This is primarily aiming at reducing risks to human health and impacts on the environment, and reaching an efficient plant protection. The essential objective of integrated production is thus a balanced implementation of measures for the production of healthy and quality food, by complying with economic, ecological and toxicological factors.

In Slovenia, integrated production is stipulated by the Agriculture Act, while detailed conditions are specified in the rules governing integrated production. Integrated production of arable plants, fruits, grapes and vegetables in Slovenia is a voluntary above-standard form of agriculture, stimulated by agri-environmental payments within the framework of the Rural Development Programme 2007–2013. Production technology, control procedures and labelling methods are provided for by the rules on integrated production and technological

instructions for integrated production, issued every year by the Ministry of Agriculture and the Environment (MAE), which also designates organisations to carry out the control and certification that provide for a constant control of the production and issue of certificates in accordance with the regulations.

In Slovenia, introduction of integrated production started in 1991. First attempts were recorded in fruit-growing, while later, integrated production spread to wine-growing and vegetable cultivation. In 2004, the system of integrated crop production was established. In 2011, in Slovenia, 52% of wine-growers, 26% of field-crop growers, 70% of fruit growers, 65% of vegetable growers and 80% of hop-growers were included in integrated production. The primary requirements of integrated production are to use PPP only when all other options have been exhausted (implementation of preventive measures, mechanical and biological pest control, etc.). Preference should be given to non-chemical procedures (mulching, false sowing or provocation method, use of harrows, hoes, thermal control, etc.), while PPP should be used only when harmful organisms exceed the damage threshold. In the case of protected crops, the use of beneficial organisms should be preferred to the use of PPP. When the damage threshold cannot be determined (e.g. fungal diseases), PPP should be applied for plant protection according to the forecast of the monitoring and forecasting service, by choosing an appropriate PPP at an optimal moment to minimise the volume of treatments and achieve their maximum effectiveness. When selecting PPP, priority should be given to those PPP that involve minimal adverse side effects on non-target (beneficial) organisms. On farms included in the integrated production, an appropriate crop rotation should also be considered (e.g. in arable farming, 5-year crop rotation), fertilisation should be applied only on the basis of soil analysis and detailed records of all operations carried out should be kept.

Organic farming with a limited range of chemically-synthesised PPP to be used for plant protection plays a significant role in minimising the risk arising from the use of PPP, resulting in practically no PPP residues to be found in products and foodstuffs. In 2011, 2,363 agricultural holdings were included in ecological control (which is 3.1% of all farms in Slovenia) with 32,148.74 ha of agricultural lands in use (6.8% of all agricultural lands in use in 2011). Considering the orientations of the European strategic documents, in the new programming period, organic farming will acquire the status of an independent and obligatory measure, which confirms the significance of organic farming in the European area.

The basic principles of organic farming and integrated production are similar, only that in integrated production, all PPP authorised that correspond to the biological target may be used in the event of occurrence of diseases and harmful organisms. Besides the principles of good plant protection practice, numerous factors are included in IPM to ensure high and quality yields, such as:

- the use of healthy seeds and plants for planting, irrespective of their origin;
- the knowledge of fertilisation system, resistant and tolerant varieties;

- technological measures of plant raising, care, physiology and nutrition;
- biological control;
- the use of mechanical and other physical plant protection measures, including weed control;
- monitoring the influence of weather conditions on the development of plants, diseases and harmful organisms, and use of the models for forecasting development stages or infections;
- taking action on the basis of warnings or forecasts by plant protection professional services, by considering calendar periods and the phenology of plants and harmful organisms established at the local level;
- the ongoing local monitoring of individual plants and collection of data on extreme events;
- the compatibility of plant protection products and their side effects, e.g. on the natural enemies of harmful organisms;
- the use of effective plant protection products and prevention of resistance.

The Agricultural Advisory Public Service organises annual training courses to inform users of PPP of the general principles of integrated pest management, which is to become a mandatory standard for agricultural production after 2014.

***Measure 17:*** *When preparing the measure of agri-environmental payments, the Ministry includes, within the framework of RDP 2014–2020 and within the framework of quality schemes, the possibility to upgrade the measures of integrated pest management.*

***Measure 18:*** *The Ministry prepares, in cooperation with professional services, guidelines for the integrated pest management in respect of an individual agricultural production sector.*

***Measure 19:*** *In order to achieve the objectives of integrated pest management, the Ministry provides for the programme (functional) connection of plant health, plant conservation, use of PPP and technology of an individual production method through the regular programmes of expert tasks undertaken by public services, professional and research institutions and research work in the field of agriculture.*

*In this view, the Ministry sets priority contents of the development of integrated pest management which are to be transposed for implementation through contracts with different public services, professional and research institutions and research work in the field of agriculture, by taking due regard also of professional services in the field of plant protection and production technology.*

***Measure 20: The Ministry will provide financial and other support for the purchase of machinery that enables taking of non-chemical measures.***

## **6.2 MONITORING AND FORECASTING PLANT HEALTH SERVICE**

With a view to keep producers of agricultural plants, allotment holders and amateur producers informed, modernisation and reinforcement of staffing of the plant health prognostic service would be necessary to provide for a proper or more targeted use of PPP as one of the pest control safeguard measures. Systematical and continuous provision of meteorological, biological and other data must be ensured for the following purposes: prediction of occurrence of harmful organisms in agriculture; monitoring the development of harmful organisms that are usually present on plants and plant products and determination of optimum deadlines for their control; recording of outbreaks and increases of populations of harmful organisms; maintenance and upgrading of centres and infrastructure for the operation of the monitoring and forecasting service.

This service operates as a public service of the Ministry for Agriculture and the Environment (hereinafter referred to as: MAE), its operation being coordinated by the Phytosanitary Administration of the Republic of Slovenia (hereinafter referred to as: PARS) under the Programme of the Republic of Slovenia for the Phytosanitary Field which is adopted by the minister for agriculture. The Slovenian plant protection service performs tasks under concessions, subject to the Plant Health Act, in the field of monitoring and forecasting of harmful organisms (monitoring and forecasting service) as well as plant health expert tasks, which include diagnostic laboratories, researches and development of new plant protection methods, including biological control.

The activity is undertaken by five centres within the service, which maintain the MAE-PARS agro meteorological network and prepare forecasts with a view to the protection of plants against the most important harmful organisms which cause economical damage in wine-growing, fruit-growing, hop-growing, olive-growing, arable farming and horticulture. As from 2002, the electronic PHYTO-INFO portal ([www.fito-info.si](http://www.fito-info.si)) has been in operation, which serves for the publication of prognostic information and for informing system users via electronic means and by SMS messages on the occurrence of dangerous plant diseases and harmful organisms as well as of plant health measures to be taken, including warnings in the event of natural hazards.

**Table 3:** The overview of diseases and harmful organisms in respect of which observations of plants and organisms as well as predictions of occurrences and products for carrying out the control (PPP) in agriculture are performed in five Slovenian regions by considering their geographical, climate and agronomic characteristics

Forecasts of the Plant Health Service of Slovenia ( <a href="http://agromet.mko.gov.si">http://agromet.mko.gov.si</a> )
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<p><b>Arable farming:</b></p> <ul style="list-style-type: none"> <li>• <b>cereals:</b> Blumeria (Erysiphe) graminis, Septoria tritici, Septoria nodorum; Leptosphaeria nodorum, Rhynchosporium secalis, Pyrenophora teres, Oulema melanopus and Aphids (Sitobion avenae, Rhopalosiphum padi, Metopolophium dirhodum, Schizaphis graminum), Diabrotica virgifera virgifera;</li> <li>• <b>potato fields:</b> Phytophthora infestans, Alternaria solani, Leptinotarsa decemlineata and Aphids;</li> </ul> <p><b>Horticulture:</b></p> <ul style="list-style-type: none"> <li>• <b>cucumber plantations:</b> Pseudoperonospora cubensis, Erysiphe orontii;</li> <li>• <b>other vegetables:</b> Ostrinia nubilalis, Delia radicum, Psila rosae, Napomyza gymnostoma</li> </ul> <p><b>Hop-growing:</b></p> <ul style="list-style-type: none"> <li>• Pseudoperonospora humuli, Sphaerotheca macularis, Phorodon humuli, Tetranychus urticae, Ostrinia nubilalis, Psylliodes attenuatus Koch;</li> </ul>	<p><b>Fruit-growing:</b></p> <ul style="list-style-type: none"> <li>• <b>apple plantations:</b> Erwinia amylovora, Venturia inaequalis, Podosphaera leucotricha, Panonychus ulmi, Aphids (Aphis pomi), Anthonomus pomorum, Hoplocampa testudinea, Cydia pomonella, Cydia lobarzewskii, Archips podanus, Adoxophyes reticulana, Leucoptera scitella</li> <li>• <b>pear plantations:</b> Venturia pyrina, Gymnosporangium sabinae, Pleospora allii, Cacopsylla pyri, Cacopsylla pyrisuga;</li> <li>• <b>peach plantations:</b> Taphrina deformans, Venturia carpophila, Stigmina carpophila, Laspeyresia molesta sin. Cydia m., Grapholita molesta, Anarsia lineatella, Cacopsylla pruni;</li> <li>• <b>cherries and sour cherries:</b> Blumeriella jaapii, Rhagoletis cerasi, Rhagoletis cingulata;</li> <li>• <b>olive trees:</b> Bactrocera oleae, Prays oleae;</li> </ul> <p><b>Wine-growing:</b></p> <ul style="list-style-type: none"> <li>• <b>Vineyards:</b> Plasmopara viticola, Uncinula necator, Phomopsis viticola, Pseudopeziza tracheiphilla, Botryotinia fuckeliana, Lobesia botrana, Eupoecilia ambiguella, Calpitrimerus vitis, Colomerus vitis, Panonychus ulmi, Pulvinaria vitis, Neopulvinaria innumerabilis, Scaphoideus titanus;</li> <li>• <b>Cutting nurseries:</b> Scaphoideus titanus</li> </ul>
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**Table 4:** The review of centres for the plant protection prognosis in Slovenia

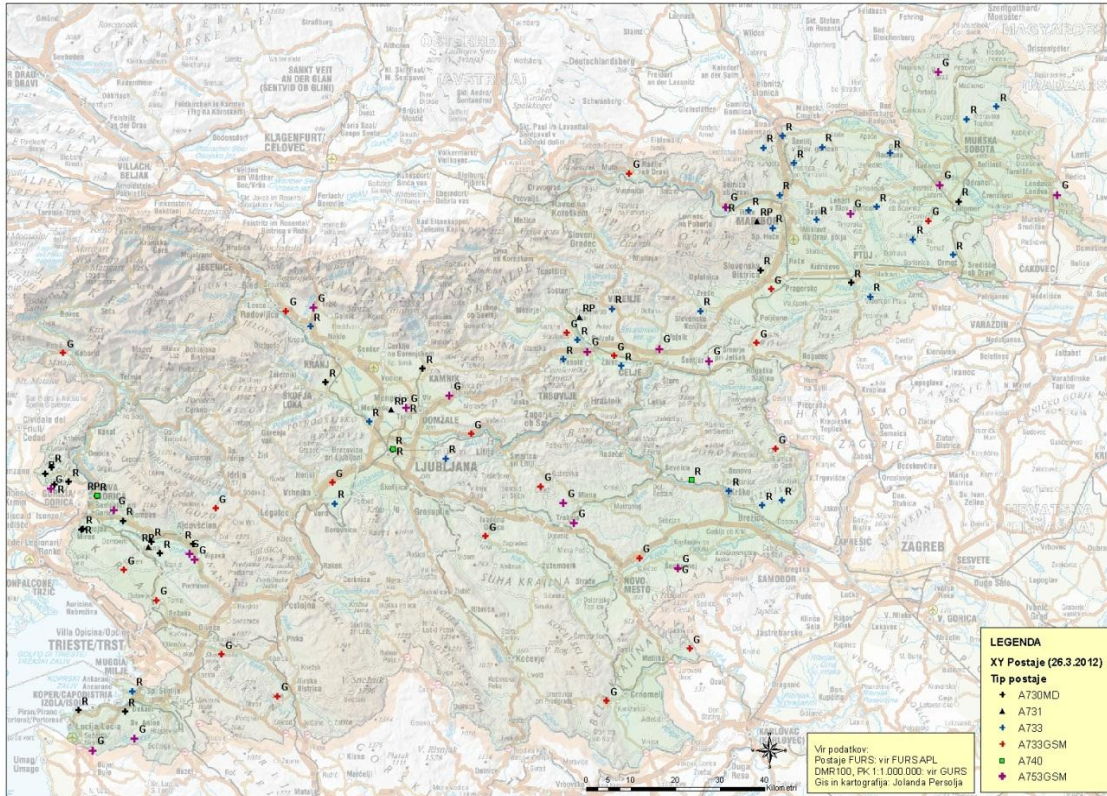
<i>Operation (situation as of 26 March 2012)</i>	<i>Institution</i>
Central Slovenia and general forecast for the entire Slovenia (3 forecasters) (17 agrometeorological stations)	<b>Agricultural Institute of Slovenia, Ljubljana</b> tel. answering machine: (01) 28 05 266 e-address: <a href="mailto:info@kis.si">info@kis.si</a> web page: <a href="http://www.kis.si">http://www.kis.si</a>
Celje and Koroška regions (3 forecasters) (13 agrometeorological stations)	<b>Institute for Hop-Growing and Brewing of Slovenia, Žalec</b> tel. answering machine: (03) 712 16 60 e-address: <a href="mailto:tajnistvo@ihps.si">tajnistvo@ihps.si</a> web page: <a href="http://www.ihps.si">http://www.ihps.si</a>
north-eastern Slovenia (3 forecasters) (28 agrometeorological stations)	<b>CAFS – Agriculture and Forestry Institute Maribor</b> tel. answering machine: 090 93 98 12 e-address: <a href="mailto:info@kmetijski-zavod.si">info@kmetijski-zavod.si</a> <a href="http://www.kmetijski-zavod.si/">http://www.kmetijski-zavod.si/</a>
south-eastern Slovenia (1 forecaster) (11 agrometeorological stations)	<b>CAFS – Agriculture and Forestry Institute Novo mesto</b> tel. answering machine: 090 93 98 17 e-mail: <a href="mailto:kss.oddelek-nm@gov.si">kss.oddelek-nm@gov.si</a> web page: <a href="http://www.kmetijskizavod-nm.si/">http://www.kmetijskizavod-nm.si/</a>
western Slovenia (3 forecasters) (28 agrometeorological stations)	<b>CAFS – Agriculture and Forestry Institute Nova Gorica</b> tel. answering machine: 090 93 98 15 e-address: <a href="mailto:entolab@kvz-ng.si">entolab@kvz-ng.si</a> web page: <a href="http://www.kmetijskizavod-ng.si/">http://www.kmetijskizavod-ng.si/</a>

**Table 5:** The agrometeorological network consists of Adcon stations of different ownership origin (situation as of 26 March 2012), which provide for data access through the portal where also data from ARSO reference stations are collected to be used in agriculture (<http://agromet.mko.gov.si>)

Centres	Owner			
	Centre	Other	MAE	TOTAL
CAFS – MB INSTITUTE	19	7	2	28
IHPS	10	1	2	13

CAFS – NM INSTITUTE	9		2	11
CAFS – GO INSTITUTE	26		2	28
AIS	17		1	18
TOTAL				98

**Image 2:** Network of agrometeorological stations on 26 March 2012



Source: PARS; <http://agromet.mko.gov.si/index.asp?ID=Varstvo/default.asp>

Prognostic centres must be closely connected with research-demonstration-experimental centres for examining the methods for the control of diseases, harmful organisms and weeds in a sustainable and biological manner, and must cooperate in the transfer of knowledge into practice by means of agricultural advisory service, agricultural technologists and other experts.

***Measure 21:*** *The Administration will upgrade the system of forecasting the occurrence of harmful organisms or recommending plant protection measures, which will include all agricultural branches: focus should be placed on the development of methods in arable farming, vegetable cultivation and growing of ornamental plants.*

*In addition to forecasting the occurrence of harmful organisms on an individual cultivated plant, the forecasting will include also pest control methods as alternatives to chemical measures. Concerning the proposed chemical measures, preference will be given to PPP with the lowest risk to human health and the environment and PPP that comply with the principles of integrated pest control. The Ministry will, with the assistance of professional services, ensure on a long-term basis that information is accessible to all producers in different ways.*

*Information intended to users of PPP must be complete; for alternative and non-chemical methods, all risks arising from their lower effectiveness as well as impacts on the quality of the yield and warnings of economic consequences must also be indicated.*

With a view to efficient implementation of the measure, the following should be provided in compliance with the existing financial and staffing possibilities of the Ministry and relevant services:

- maintenance and strengthening of the public service in the light of financing the existing systems;
- cooperation of the existing advisors operating in KGZS and of other available experts in public institutions, so that they are fully involved in the system of the monitoring and forecasting service;
- long-term maintenance, upgrading and financing of: data warehouse for prognostic data, software for processing meteorological data, preparation of prognostic notifications, delivery of notifications and web portals for public informing – warning system and assistance to producers in taking decisions;
- maintenance of a network of monitoring/measuring points of an appropriate density (agro-meteorological stations: measurement devices, monitoring the phenology of agricultural plants and harmful organisms).

***Measure 22:*** *With the aim to support the introduction of integrated pest management, including the operation of the monitoring and forecasting service and experts, in plant protection, the Ministry will take actions to improve advisory service, equipment, information systems, reinforcement of the staff and extension of work contents by upgrading the established good plant protection practices and integrated pest management or, when appropriate, by biological plant protection.*

### **6.3 DEVELOPMENT AND RESEARCH OF NEW PLANT PROTECTION METHODS**

In order to address the needs of Slovenian agriculture, corresponding research-experimental-demonstration centres (arable farming and horticulture, fruit-growing and tree nursery, vine-



growing and wine nursery), which will be the basis for a permanent provision of research, professional and technological developments of integrated pest management in individual fields, should be reinforced with the aim to minimising the risk of use of PPP. In these centres, new pest management methods will be studied, appropriate alternative methods will be introduced, such as biological control, mechanical and other non-chemical methods, as well as relevant technological solutions, by taking due regard of the basic principles of IPM. The centres will also provide for the transfer of knowledge to advisors and other experts who would transfer such solutions into practice. Solutions will be incorporated appropriately in the IPM principles.

The existing centres should be reinforced on the basis of joint programmes with plant protection experts at regional institutions, institutes and universities by applying the present facilities, which would result in a minimum extent of qualified and equipped professional institutions with specialists who may take a credible part in national and international projects and the transfer of knowledge of integrated pest management into the Slovenian practice.

The ongoing tasks of laboratories for diagnosing organisms harmful to plants should be linked with observations of modifications in the cultivation and natural environment and with early information of hazards posed by harmful organisms, by taking into account any eventual adjustments resulting from the forecast climate changes.

The public plant health system, professional services, which must assist in the control of diseases and harmful organisms that occur in the territory of Slovenia and involve economic, social, nature-protection or environmental damage, should be included in the activities of demonstration-experimental centres, and the transfer of non-chemical preventive methods from the control of quarantine harmful organisms into ensuring plant health in a certain production should be ensured.

Mechanisms should be applied with a view to a transparent, high-capacity and efficient national and international exchange of information concerning new risks for human, animal and plant health and the environment:

- in-the-field collection of biological and environmental information through monitorings and systematic special controls of harmful organisms;
- keeping, processing and delivery of information on harmful organisms, including spatial analysis and model processing in the geographical information system;
- linking of international contact points in Slovenia into the information network.

The existing centres that are located in the areas with various climate and production conditions should be turned into demonstration-experimental centres for IPM in respect of individual production types (e.g. Jable centre, experimental centres for fruit-growing, wine-growing, hop-growing, etc.).

### **6.3.1 Experimental centres for fruit-growing, wine-growing, olive-growing and hop-growing**

Owing to environmental diversity, two centres for wine-growing have been established in Slovenia: for the Primorje wine-growing region – Selection and Nursery Centre Vrhopolje near Vipava, and for the Podravje and Posavje wine-growing region – Selection and Nursery Centre Ivanjkovci near Ormož. The main task of both centres is the provision of initial parent propagating material of the vine, in particular of varieties, clones and indigenous varieties which ensure stable and quality yields in our climate and soil conditions, and enhance the economy of production. Their main activity is the production of a healthy selected basic material, intended for the supply of wine nurserymen, and the selection of new elite vines of all important varieties. The said tasks require long-standing continuous work which, owing to the nature of procedures, shows results only after a long period of time, however provides wine-growers with a constant supply of quality certified planting material necessary for the recovery of Slovenian vineyards planned. The result of the long-standing substantial work was also the confirmation of 39 new Slovenian clones of the vine. The work continues with a new cycle of selection, choice and breeding of elite vines of important varieties and also interesting indigenous varieties.

Considering its favourable soil and climate conditions, fruit-growing is one of the major activities of the Primorje region, which is the biggest production region for stone-fruit owing to its geographical position. The major task of the Fruit-Growing Centre Bilje is regular supply of Slovenian nurserymen with the healthy initial material (grafts) of stone-fruit. The majority of varieties in demand of the standard (CAC) and certified status are obtained from stock nurseries and from the cultivation under plastic net cover, where the material of a high genetical value and appropriate health status is produced, which enables certification of plants for planting under European standards. Grafts supplied are mostly of varieties which are subject to the highest demand, except if protected varieties are involved. Indigenous varieties also gain commercial attractiveness. Another important task of the centre is testing of varieties and rootstocks for stone-fruit species, in particular peaches, cherries, plums and apricots, and examination of technologies in respect of selected varieties and rootstocks. The data thus gained is intended for assessing the suitability of new varieties for growing in our soil and climate conditions, which is to be taken into account in connection with the selection of varieties in fruit selection revisions. Technological recommendations and instruction should be issued to producers in order to be able to reach better results in the production of new varieties or rootstocks. The centre must continue its cooperation with all professional institutions and business associations (commerce) in testing market-attractive varieties, indigenous varieties and rootstocks, by taking account of the natural features and climate conditions, and in the selection undertaken with a view to obtaining own parent plants; further carrying out of applicative and development tests in fruit-growing is necessary.

Owing to its geographical position in the largest production area for stone fruits, the Fruit-Growing Centre Maribor is the most suitable for such kind of testing. The major task is to supply Slovenian nurserymen with the quality initial material of stone-fruit of a virus-free status; for this purpose, a parent plantation for the production of virus-free grafts of apples and pears and a parent rootstock nursery for apples is maintained in the centre. The tasks of the special examination of varieties and rootstocks of fruit species, including the seeking and testing of more appropriate species, varieties and clones adapted to extreme production conditions, include the applicative testing for direct production, research testing carried out in cooperation with research institutions and technical and applicative testing. Another important aspect is examining the way of minimising the input of synthetic chemical preparations and replacement of such preparations with sufficiently effective natural active ingredients and with mechanical methods, as well as the rational use of irrigation water with a view to determine minimum quantities of water to ensure stable fertility and high quality of yield.

The activity of the centre is also testing the technologies for a sustainable and human-friendly production, by continuing to develop the technologies of integrated and organic farming. A systematic approach is being introduced for the preservation and re-establishment of orchard fruit stands, consisting of identification and evaluation of old (indigenous) varieties. The results of these activities are used as an important basis for establishing fruit selection to serve as a professional recommendation to fruit-growers.

The tasks of the centre for olive growing are: the care of introduction plantations; the discovery and maintenance of unknown varieties and clones through the propagation and maintenance of collection plantations; the care of mother plantations; establishing fertility of the variety *istrska belica* relative to the various reproduction methods; assessment of the impact of soil and nutrient content in leaves on fertility; monitoring the protection against olive fly, olive leaf spot and olive violet spot; and monitoring the ripening of two varieties with regard to the oil content and quality of olive oil at different times of harvest.

The specialty of the activities taken in the centre for olive growing is the final product – oil. A significant proportion of resources is destined for processing and analysing.

At the Institute for Hop-Growing and Brewing of Slovenia in Žalec, an intensive hop breeding programme has been undertaken for over 50 years, with a view to obtaining new Slovenian hop varieties, adapted to our soil and climatic conditions, resistant to diseases, in particular hop downy mildew and powdery mildew on hops and, recently, also to the hop quarantine disease – hop wilt. They also produce planting material within the scope of hop certification schemes by maintaining initial parent plants, basic parent plants and certified hop plants for planting which are virus-free and viroid-free. Healthy and quality planting material is the basis for further protection of hops under the guidelines for integrated production. At the Institute, new PPP have been tested for a number of years, which are less burdensome for the environment, humans and non-target organisms. They also introduce other agri-technical

measures which aim to reduce the population of harmful organisms, and introduce ecologically-based protection of hops. They inform users on a regular basis of the results of tests at lectures, regular technological meetings, seminars, and invite them to get acquainted with the latest achievements and knowledge. They also perform tests in the field of use of PPP, which includes the use of low-drift nozzles and all measures that contribute to the reduction of drift of pesticide mixtures (use of airlocks, one-side border spraying, various application methods, etc.). They carry out researches in the field of PPP application also in respect of other agricultural plants, not only in hop-growing.

***Measure 23:*** *Since being oriented into decreasing the use of pesticides, experimental centres for fruit-growing, wine-growing and olive-growing as well as professional institutions in the field of horticulture, arable farming and hop-growing will also focus their studies on the optimum technologies in the production, which are effective in the controlling of diseases and harmful organisms and lead to reduced risks resulting from the use of PPP and their detrimental effects, including biological plant control, sustainable use of PPP, and thus reduced risks. They will continue to test new resistant or tolerant varieties. They will represent examples of good agricultural practice to users in the form of visits, organised lectures and practical presentations and thus kept them informed of all novelties in relation to plant health.*

### **6.3.2 Experimental centres for horticulture**

The programme of horticultural centres and stations has been carried out since 1992. Experimental-demonstration centres or stations operate in different production areas of Slovenia. Through their infrastructure, they ensure a quality carrying out of tests included in the Programme of special testing of vegetable varieties, and enable a direct transfer of knowledge to users in individual production areas. Owing to the variegated agro-ecological conditions, varieties and vegetable production technologies need to be tested at different places, and recommendations should be elaborated for individual production areas. Also in operation are the following centres: the Horticultural Centre at the Agricultural Institute of Slovenia and the Horticultural Centre at the Biotechnical Faculty in Ljubljana, and stations: the Horticultural Station in Nova Gorica and the Horticultural Station at Ptuj.

With a view to establish adaptability to our growing conditions, vegetable varieties should be checked in our production conditions, since using appropriate vegetable varieties that are adapted to growing conditions and give good yields of appropriate quality and are resistant to diseases and harmful organisms, is of the key importance for economic production.

***Measure 24:*** *The Ministry promotes development, seeking and introduction of new technological solutions, with the emphasise on integrated pest management and testing of*

*varieties that are resistant to diseases and harmful organisms or tolerant to stress growing conditions and appropriate for our soil and climate conditions.*

*The Ministry will also stimulate organic farming in gardens; to this end it will prepare, together with professional services, guidelines of good plant protection practice in gardens.*

## **7 RISK INDICATORS**

It is necessary to measure the progress achieved in the reduction of risks and adverse impacts of pesticide use for human health and the environment. Appropriate means are harmonised risk indicators, which are intended for the monitoring of achieving the objectives of NAP. They are used for risk management at the national level and for reporting purposes.

Based on the measures for achieving the objectives of NAP, we propose the following risk indicators to be applied:

### **1. volume of the sale of PPP**

- sales data may be monitored also in respect of individual groups of active substances that, due to their properties, involve greater risk for the environment and human health, in particular substances that are identified as candidates for substitution under regulations that govern plant protection products;
- 2. **frequency of the use of PPP** – index expressing data on how many times a certain agricultural surface may be cultivated/sprayed in each year with the sold quantity of a certain PPP, provided that recommended dosage for such a product is adhered to;

$$\text{PR-index} = \Sigma (\text{PK}_{a. s.} / \text{SO}_{\text{plant species}}) / \text{VPP}_{\text{plant species}}$$

**all active substances**

**PK<sub>a. s.</sub>**: sold amount of a certain active substance in one year (sold amount)

**SO<sub>plant species</sub>**: standard dose for every active substance in every culture (standard dose)

**VPP<sub>plant species</sub>**: area under cultivation by a particular crop/crop type

*When interpreting this indicator it should be taken into account that the entire sale of an active substance is attributed to the use in agriculture, although certain active substances may be used also in other activities.*

3. **load-factor or load index**, which is based on the calculation of proportion between the sold quantity of an active substance in a certain time period (one year) and the product of the total area under cultivation and LD<sub>50</sub> or LC<sub>50</sub> (dose or concentration that causes death in 50% of the organisms exposed). The said index is calculated for all active substances sold, and be expressed as follows:

$$OI = \Sigma (PK_{a. s.} / (TOX \times SOP_{year}))$$

**all active substances**

PK<sub>a. s.</sub>: sold quantities of a certain active substance in one year (*sold amount*)

TOX: LC<sub>50</sub> or LD<sub>50</sub>

SOP<sub>year</sub>: total areas under cultivation (*cultivated land*)

*When interpreting this indicator it should be taken into account that the entire sale of an active substance is attributed to the use in agriculture, although certain active substances may be used also in other activities.*

4. consumption of pesticides in agriculture (consumption of an active substance in kg/ha);
5. the number of users who have received the training under the new programme (data on the number of participants of the training);
6. the number of distributors, advisors and vendors who have received the training under the new programme (data on the number of participants of the training);
7. the number of users who have received the training under AEP programmes, which include contents on the integrated pest control;
8. the number of PPP application devices tested under the new programme;
9. the number of new PPP application devices in use;
10. the mean age of PPP application technique in use;
11. the number of new devices intended for the non-chemical control of harmful organisms;
12. the proportion of samples of foodstuffs with exceeded maximum residue levels of PPP (national production and other production);
13. the proportion of samples of foodstuffs that contain PPP residues (data are supplied by types of food: fruits, vegetables, cereals, etc.);

14. the proportion of samples of groundwater, which does not satisfy the requirement under the Framework Water Directive;
15. the proportion of samples of drinking water, which does not satisfy the requirement under the regulations on drinking water;
16. the proportion of samples of surface water, which does not satisfy the requirement under the Framework Water Directive;
17. the number/proportion of agricultural holdings included in organic production;
18. the proportion of agricultural surface under cultivation, where organic farming is carried out;
19. monitoring adverse effects of PPP to human health (toxicovigilance), as follows:
  - a) the number/proportion of adverse effects or toxications of operators and/or agricultural workers with PPP;
  - a) the number/proportion of adverse effects or toxications of humans with PPP through diet;
  - a) the number/proportion of adverse effects or toxications due to improper use of PPP.

## **8 DATA COLLECTION AND METHODS OF REPORTING**

The Ministry establishes an expert group to collect data required or draws up reports by individual measures. On the basis of data, reports and analysis, an annual report on the progress made in achieving the objectives of NAP and proposals for future activities is prepared. The expert group may also propose an amendment to NAP with additional measures for achieving the objectives of NAP.

To calculate risk indicators, the Ministry uses statistical data collected in accordance with Community regulations concerning statistics on plant protection products, together with other appropriate data. Trends in the use/sale of certain active substances should be identified.

When calculating risk indicators, priority should be given to active substances (that belong to the group of problematic substances), plants, regions or practices, that require particular attention or good practices that can be used as examples in order to achieve the objectives of this programme to reduce the risks and impacts of pesticide use on human health and the environment and to encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides.

When determining quantity targets, the Ministry takes into account opinion of the expert group.

The report on achieving the objectives of the programme is prepared in cooperation with the expert group that participated also in the preparation of the programme. Additional members are included in the expert group, if necessary.

The expert group consists of representatives of individual institutions, which perform activities in relation to an individual measure, including non-governmental organisations.

The report is published annually on the Ministry web page.

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<sup>i</sup> Resolution on strategic guidelines for development of the Slovenian agriculture and food technology by 2020 – 'Zagotovimo.si hrano za jutri'. Official Gazette of the Republic of Slovenia, No 25/11 as of 4 April 2011.

<sup>ii</sup> Urek, G., M. Knapič, M. Zemljič Urbančič, V. Škerlavaj, A. Simončič, J. Persolja, M. Rak Cizej, S. Radišek, M. Lešnik (2012) Raba fitofarmaceutvskih sredstev in preučitev možnosti za njihovo racionalnejšo uporabo v Sloveniji (Use of plant protection products and studying the possibilities for their more rational use in Slovenia).- Agricultural Institute of Slovenia, Ljubljana, 163 p.

<sup>iii</sup> International Plant Protection Convention – IPPC. Act ratifying the Plant Protection Convention (amended), Official Gazette of the Republic of Slovenia – International Treaties, No 23/00; Official Gazette of the Republic of Slovenia, No 84/00.

<sup>iv</sup> Code of maximum values of residues in food and feed (FAO/WHO Codex Alimentarius).

<sup>v</sup> Convention on Biological Diversity – CBD) and its Cartagena Protocol on Biosafety.

<sup>vi</sup> WTO Agreement on the Application of Sanitary and Phytosanitary Measures; SPS Agreement.

<sup>vii</sup> EPPO Standards.

<sup>viii</sup> Decision on the prohibition and/or restriction of use and the placing on the market of certain toxic substances and preparations derived from them used as plant protection products. Official Gazette of the Republic of Slovenia, No 29/96.

<sup>iv</sup> Urek, G., Gartner, A., Gregorič, A. 1995. Onesnaženost krompirja in krompirišč z ostanki fitofarmaceutvskih sredstev (Contamination of potato and potato fields with pesticide residues). *Zbornik predavanj in referatov z 2. slovenskega posvetovanja o varstvu rastlin (Proceedings of lectures and papers from the 2<sup>nd</sup> Slovenian consultation on plant protection, 1995, p. 163–175.*

<sup>x</sup> Maček, J. 1992. Kontaminacija tal in rastlinskih pridelkov z ostanki fitofarmaceutvskih sredstev v Sloveniji v obdobju 1973–1991. (Contamination of soil and crop products with pesticide residues in Slovenia in the period



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1973–1991.) Zbornik Biotehniške fakultete Univerze v Ljubljani (Proceedings of the Biotechnical Faculty in Ljubljana), 1992, vol. 59, p. 229–240.

<sup>xi</sup> Order concerning the prohibition or restriction of marketing and/or use of plant protection products containing certain active substances. Official Gazette of the Republic of Slovenia, No 105/01

<sup>xii</sup> Tojnko, S., Schlauer, B., Vogrin, A. Slovenska integrirana pridelava sadja (Slovenian integrated fruit production). *Sodobno kmetijstvo* 1996, vol. 29, 4, p. 171–175.

<sup>xiii</sup> Stanislav VAJS, Mario LEŠNIK, Milica KAČ. MOŽNOSTI ZMANJŠEVANJA POJAVOV ZANAŠANJA (DRIFTA) HERBICIDOV PRI ZATIRANJU PLEVELOV V KORUZI Z UPORABO STANDARDNIH ALI ANTIDRIFTNIH ŠOB (POSSIBILITIES FOR THE REDUCTION OF HERBICIDE DRIFT AT WEED CONTROL IN MAIZE BY USING STANDARD OR DRIFT-REDUCING NOZZLES). Zbornik predavanj in referatov z 2. slovenskega posvetovanja o varstvu rastlin (Proceedings of lectures and papers from the 2nd Slovenian consultation on plant protection), Radenci, 6 and 7 March 2007.