

**NATIONAL FRAMEWORK FOR  
ENVIRONMENTAL ACTIONS UNDER  
OPERATIONAL PROGRAMMES OF  
PRODUCER ORGANISATIONS IN THE FRUIT  
AND VEGETABLE SECTOR**

**FIRST MODIFICATION**



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# 1 INTRODUCTION

The purpose of this report is to develop the so called national framework for environmental actions taken by producer organisation in the fruit and vegetable sector. By the end of 2008, in Poland there were 103 preliminarily recognised producer groups registered as well as 6 recognised producer organisations in the fruit and vegetable sector. Producer organisations receive EU funding to support their operational funds for environmental actions. Operational funds, intended for implementation of operational programmes, are established only by producer organizations and can be partly subsidized by the European Union (in relation 60:40). Maximum EU funding cannot exceed 4.1% of the value of production produced by the members of organisation and sold by the organisation itself. Organisations may utilise the operational funds for various purposes at their own discretion, however, with one restriction – a part of the operational funds must be assigned for environment protection.

During the last reform of the common organisation of the market in fruits and vegetables in 2007, emphasis was placed on encouraging producer organisations to undertake environmental actions under their operational programmes. Like with other Member States having recognised producer organisations in the fruit and vegetable sector, Poland is required to establish a national framework for the environmental actions<sup>1</sup>. The framework must provide the general requirements that environmental actions have to meet and set out a non-exhaustive list of environmental actions that could be eligible for support and the conditions therefore applicable. Moreover, for each environmental action selected, the framework must indicate the specific commitment or commitments entailed (i.e. the specific requirements to be complied in order to be eligible for support) and the justification of the action based on its expected environmental impact in relation to environmental needs and priorities. By doing so, the framework for environmental actions also provides guidelines for producer organisations in their environmental initiatives. In Poland operational programmes must include at least two activities for the environment protection.

One of the main objectives of national framework is to ensure that fruit and vegetable sector remains permanently nature and environment friendly. The key element of the efforts aimed at fulfilling this objective is to identify areas where the sector can act effectively with regard to nature and environment. Therefore, it is necessary to conduct a baseline analysis. The analysis is based on data provided by Polish research institutes<sup>2</sup>, and it should be used to identify priority *action areas* (e.g. preserving the quality of water, reduction of exhaust emissions, etc.). In those areas, producer organisations can be subsidised in their actions. It is important to ensure that the actions are compliant with and complementary to other agriculture and environment related programmes, as well as to avoid the risk of double financing of actions. Furthermore, producer organisations should be environment-friendly also in implementing other objectives – e.g. gaining competitiveness.

## 2 BASELINE ANALYSIS OF THE ENVIRONMENTAL SITUATION IN FRUIT AND VEGETABLES SECTOR.

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<sup>1</sup> See Article 103f of Council Regulation (EC) No 1234/2007 of 22 October 2007 establishing a common organisation of agricultural markets and on specific provisions for certain agricultural products (Single CMO Regulation) (OJ L 299 of 16.11.2007, p. 1).

<sup>2</sup> Research Institute of Vegetable Crops in Skierniewice, The Research Institute of Pomology in Skierniewice, The Institute for Land Reclamation and Grassland Farming in Falenty.

Production of fruit and vegetables in Poland, is very intensive, and usually involves increased consumption of water, energy and plant protection products. This can have a serious impact on the environment. The purpose of this analysis is to illustrate how the production of fruit and vegetables influences the environment, so as to identify priority environmental issues to be addressed by actions implemented under the operational programmes of producer organisations.

The table below contains objectives and common baseline indicators from Annex XIV of the Commission Regulation (EC) No 1580/2007<sup>3</sup>, which will provide the basis for the analysis.

Objective	Indicator
Soil protection	Area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented (ha).
Maintaining and improving water quality	Area under fruit production subject to reduction in use or better management of fertilizers (ha).
Sustainable use of water resources	Area under fruit and vegetable production with water saving measures (ha).
Habitat and biodiversity protection	<ul style="list-style-type: none"> <li>● Area under organic production of fruit or vegetables (ha).</li> <li>● Area under integrated production of fruit or vegetables (ha).</li> <li>● Area concerned by other actions contributing to habitat and biodiversity protection (ha).</li> </ul>
Landscape conservation	n.d.
Climate change mitigation	<ul style="list-style-type: none"> <li>● Estimated annual consumption of energy for greenhouse heating purposes by type of energy source (Tonnes/Litres/m<sup>3</sup>/Kwh per tonne of marketed production).</li> <li>● Estimated annual consumption of internal transport purposes by fuel type (Litres/m<sup>3</sup>/Kwh per tonne of marketed production)</li> </ul>
Reducing the volume of waste generated	n.d.

Proper analysis of the impact of fruit and vegetable sector on the environment will require considering two main aspects:

**Sector size:** Fruit and vegetable sector covers 1.62% of the total area of Poland, i.e. 558.9 thousand ha. In 2007, total area covered by orchards exceeded 336.8 thousand ha – an increase of 59.2 thousand ha (21.3%) in comparison to 2004. Apple trees constituted 62.0% of the total area covered by fruit trees cultivated in orchards, sour cherry trees - 13.3%, plum trees - 7.8%, sweet cherry trees – 3.6%, pear trees – 4.6%, and other types - 8.6%. In 2007, cultivation area of field vegetables in Poland was 217 thousand ha. Greenhouse vegetable crops covered in 2007 a total area of 5 thousand ha. Around 61.7% of this area was covered

<sup>3</sup> Commission Regulation (EC) No 1580/2007 of 21 December 2007 laying down implementing rules of Council Regulations (EC) No 2200/96, (EC) No 2201/96 and (EC) No 1182/2007 in the fruit and vegetable sector (OJ L 350 of 31.12.2007, p. 1)

by foil tunnels, circa 37.9% - by greenhouses, and just over 0.4% - by cold frames. In 2007, mushroom cultivation covered a total area of 225 ha, and the harvest reached 205 thousand tonnes.

Concentration of fruit and vegetable growing is particularly high in certain parts of the country, and those areas are usually dominated by one type of production. The results of environmental actions undertaken will be mostly local, however. Poland is among the biggest fruit producers not only in Europe, but also worldwide. In 2006, 19.6% of total apple production in EU-27 came from Poland, mostly from such regions as grójecki, lubelski and sandomierski.

**Diversification of the sector:** To tailor individual environmental actions to the specific nature of production technology in fruit and vegetables production, 5 sub-sectors have been distinguished: tree fruit, berries, field vegetables, vegetables grown under cover, and cultivated mushrooms.

## 2.1 Impact of fruit and vegetable sector on soil

Agricultural practices and related activities applied in fruit and vegetable production involve mechanical processing of soil, fertilizing and using pesticides to protect the crops. Those activities are different for each type of crop, such as: brassica vegetables, solanaceous vegetables, gourd vegetables, allium vegetables, legume vegetables, brassicaceae vegetables, etc., and fruit cultivation, i.e. tree fruit (drupe fruit, pome fruit) and small fruits.

Neither properly organised production, even if it is intensive, nor application of plant protection products, when in line with principles of agricultural practices, lead to soil degradation. Unfortunately, mistakes are made frequently, which result in deterioration of soil and decrease or even loss of its production value (destruction of natural crumble structure, soil erosion and pollution as a result of improper use of pesticides and mineral fertilizers). Soil quality is also endangered when there is no crop rotation, due to specialisation, long-lasting monocultural cultivation, improper layout of fields and roads, improperly executed agricultural practices and inadequate ground cover.

The basic risks for soil resulting from horticultural production include:

- excessive mineralization of the organic matter in soil and reduced fertility,
- contamination of soil as a result of improper application of fertilizers and pesticides,
- loss of soil components as a result of unilateral exploitation of the soil, which leads to decreased fertility,
- soil degradation as a result of insufficient application of organic fertilizers,
- increased vulnerability to wind and water erosion.

Cultivated mushrooms production does not influence soil in a negative way. The influence can in fact be beneficial, as the mushroom substrate is a valuable organic fertilizer, used to fertilize the soil for field cultivation of fruits and vegetables, which positively influences the structure of soil, increases its sorptive capacity, and has phytosanitary impact on certain soil pathogens.

### *Indicator*

The common baseline indicator defined in the EU legislation is the area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented, expressed in hectares [ha]. No data is available to estimate this indicator in Poland.

## 2.2 Impact of fruit and vegetable sector on water quality

Fruit and vegetable production is, in general, connected with intense fertilizer and pesticide application. A considerable portion of those products, particularly in case of fertilizers highly soluble in water, is leached out and penetrates the surface waters.

Thanks to the applied technology and the small acreage under production, the sub-sector of cultivated mushrooms has only a minuscule impact on the water quality in Poland.

### Fertilizing

Intensive horticultural production is based on extensive mineral fertilization, while organic fertilization and rotation are limited. It leads not only to soil degradation, but also to a possible decrease of water quality. Soils in Poland are mostly light and highly-permeable, which increases the likelihood that nutrients, released to soil with mineral fertilizers and not absorbed by the plants, and pollute ground and surface waters. Irrigation of heavily fertilized cultivation areas maximizes this risk.

Intensive fertilization may be a great hazard for the environment as it can pollute ground and surface waters with nitrates and phosphates, and damages the quality and storage capacity of vegetables. If the amount of mineral ingredients used in field cultivation exceeds the demand of plants, such minerals may be leached by superficial runoffs following torrential rains, or penetrate into the deep layers of soil. They may also contaminate groundwater as they permeate with rain water or sprinkler irrigation water. Water from drains and surface runoffs transports a considerable amount of nutrients - nitrogen, in particular - which contaminate rivers and lakes. Annually, 20-120 kg of nitrogen are leached from 1 ha of vegetable crops.

In organic agricultural holdings, where cultivation is supervised by certification bodies, the use of mineral fertilizers with nitrogen is prohibited. Alternative ways of adding nitrogen in soil in those organic holdings include: organic fertilization, utilisation of green manure containing bacteria which fix atmospheric nitrogen (clover, lupin, ornitophus and others) and soil-added preparations which contain this type of bacteria.

Fruit trees have a relatively low demand for nitrogen in comparison to vegetable crops. With a yield of about 45 tonnes/ha<sup>-1</sup> apple trees require around 110 kg of N/ha out of which 39 kg are lost irrevocably and the remaining part, i.e. around 71 kg of N/ha<sup>-1</sup>, returns to soil. For comparison, wheat needs around 180 kg of N/ha<sup>-1</sup>, cabbage - around 280 kg of N/ha<sup>-1</sup> and carrot - around 285 kg of N/ha<sup>-1</sup>.

### Pesticides

Use of pesticides in fruit and vegetable sector is a must. Monitoring surveys in Poland prove that the most intensive pesticide protection is used in apple trees, field tomatoes, strawberries, sour cherry trees and field cucumbers – with an average application of 9.28; 8.70; 6.59; 6.02 and 5.80 kg of active substances per 1 ha, respectively<sup>4</sup>.

Pesticides, when used, penetrates to the environment mostly in result of migration (e.g. they are carried by wind over considerable distances) or sedimentation of the soil surface.

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<sup>4</sup> The average consumption of plant protection products in Poland for all types of cultivation included in the survey was 1.86 kg of active substances per 1 ha.

Pesticides, after being applied on plants or soil, undergo a series of physical, chemical and biological mutations, and can pollute soil and waters.

The amount of pesticides in waters depends heavily on the intensity of cultivation in a particular region and, consequently, on the intensity of pesticide use, on the type of cultivation, the season, as well as precipitation and the flow rates of watercourses.

The biggest risk of pesticide pollution occurs when they are applied on plants, and when spraying equipment is filled or cleaned. As the use of most pesticides is prohibited in organic production of fruit and vegetables, it is the safest type of cultivation in terms of pesticides pollution.

Negative impact of plant-protection products on water quality has been recently considerably reduced, thanks to the improvements in their performance (current generations of pesticides contain active substances which undergo a complete microbiological and photochemical decomposition, or are assimilated by the plants), and better spraying techniques (highly accurate and regular application).

There is not enough data in Poland on sedimentation of active substances from plant-protection products in water. However, random data collected by research carried out by scientific institutes indicate that the pesticide pollution of surface waters is relatively more advantageous than in other member states.

## **Wastewaters**

Certain activities performed originally by processing plants are being currently adopted by horticultural holdings, which has created a new type of hazard for the water resources. These include fruit and vegetable washing processes, resulting in contamination of waste water with considerable amount of suspended matter. Unfortunately, only a small number of Polish horticultural holdings have wastewater treatment facilities, and therefore wastewater with large amount of suspended matter is discharged directly into natural watercourses, leading to water pollution.

### *Indicators*

The common baseline indicator defined for this objective is an area grown with fruit and vegetable crops subject to reduction of fertilizer use or to better fertilizer management - **28 422,00 ha**. This area may be deemed to be the total area of all organic and integrated fruit and vegetable crops. In this respect:

- Area under organic production of fruit and vegetables crops: **21 000,00 ha**
- Area under integrated production of fruit or vegetables crops: **7 422,00 ha**

## **2.3 Impact of fruit and vegetable sector on sustainable use of water resources**

Poland has limited available water resources which is partly a result of low precipitation rate (in most parts of the country around 550 mm annually) and low retention level. Development of certain industries is already limited in some regions by insufficient access to water resources of adequate quality, and antropogenic climate changes can only increase the problem. Thus, sustainable approach to water resources exploitation should be treated as a priority.

In Poland, agriculture contributes to overall water consumption in around 10%, whereas the average in Europe, according to European Environment Agency (EEA), is 25%. The fruit and vegetable sector contributes considerably to the overall water consumption in agriculture.

Vegetables with edible vegetative parts (stem, root, leaves) need the greatest amounts of water during the intensive growth of their vegetative mass. Insufficient water supply in this period leads to distorted physiological processes and, as a result, to decreased yield. Vegetables with edible generative parts (flowers, fruits, grains) are especially vulnerable to water shortages in soil during the transition from vegetative to generative phase. Insufficient water supply leads to, among others, blossom fall, premature fruit drop or poor seed setting.

Long-lasting droughts considerably limit the development of intensive fruit growing. Orchards irrigation has become an obligatory agricultural practice. High density of trees in a given area, with a limited root expansion of dwarf and semi-dwarf rootstocks, leads to an increased tree competition for water and nutrients in soil.

In 2007, 7.8% of the orchard area in Poland was irrigated. The most commonly used irrigation system is drip irrigation, as it is the most economic one. Demand of various fruit trees and shrubs for water differs, depending on their species and rootstock (depth of rooting). Other important factors include the local climate and soil conditions, land shape, groundwater level, and the use of space between rows (lawn or fallow). The shallower root expansion, the bigger the water demand of plants; therefore fruit shrubs are normally more vulnerable to water shortage than fruit trees.

Irrigation of fruit and vegetable crops is essential to meet their water needs. Production of leaf vegetables is almost entirely dependant on irrigation. In field growing of vegetables, the most frequently used irrigation technique is sprinkling (mobile sprinkling machines with rotary sprinklers or a sprinkle beam). However, evaporation during the irrigation process leads to considerable losses and to uneven water distribution. Drip irrigation, on the other hand, has become very popular in greenhouse growing. Using more effective and economic water management systems is also highly beneficial for the producers, as exploitation of public water supplies and electricity necessary to draw water from deep wells, which constitute the main source of water for horticultural holdings, are relatively expensive.

Information obtained from mushroom producers shows that water is used economically in mushroom production as a cost-cutting exercise. Research conducted by the Research Institute of Vegetable Crops proved that diversification of times and frequency of irrigation, as well as of daily water supply, did not influence substantially the yield or the quality of fruit bodies.

### *Indicators*

The common baseline indicator defined here is an area under fruit and vegetable crops, on which water saving measures are used.

In 2006, over 20% of the overall vegetable growing area (i.e. 44.7 thousand ha) was irrigated by mobile and stationary sprinklers. 178.8 thousand ha were not irrigated – this area can be considered as area under fruit and vegetable crops on which water saving measures are used.



## 2.4 Impact of fruit and vegetable sector on biodiversity and biotopes

The way and excessiveness of impact that horticultural production has on biodiversity is not much different from that of other types of agricultural activity. Nevertheless, currently in Poland this impact is higher because of a more intensive nature of fruit and vegetable production, as compared to other types of agricultural field production. This impact can be analysed at three levels:

- genetic diversity;
- species diversity;
- habitat (landscape) diversity.

When considering the impact on diversity, the following should also be taken into account: diversity of cropped plants and diversity of wild plants.

Genetic diversity of field plants is influenced by two factors: firstly, by pursuit to obtain maximum possible genetic uniformity of cultivated varieties (to ensure even ripening, as well as identical response to agricultural practices and cultivation measures undertaken, and also similar shape and colour of the fruit, etc.) and, secondly, by eliminating genes of varieties which cease to be cultivated.

Species diversity of cropped plants is endangered by, in particular, producers deciding to cease cultivation of a particular species.

Species diversity of wild plants is endangered by chemical products commonly used in horticultural production: mineral fertilizers and, most of all, pesticides. Application of pesticides has a direct impact on selected species (destroying weeds or killing animal species which, from the agricultural point of view, are considered harmful) and an indirect impact – by limiting the nutrition base and destroying hideouts of beneficial animals and neutral organisms, changing habitats (eutrophication) and, as a result, changing ecosystems and limiting the population of sensitive species.

Additional threats are related to agricultural landscape transformations: introduction of crops monoculture, destroying mid-field boundary strips, limiting ecotones (transition zones on the boundary of two different biocoenoses). All these factors lead to impoverishment of the nutrition base of wild animal species.

Specialised horticultural holdings are usually characterised by small crop diversification and low biodiversity. At the same time, impoverishment of botanical composition of flora is accompanied by increased occurrence of synanthropic species (plants associated with humans). Human development activities result in expansion of numerous alien plant species, which can considerably influence natural plant communities. Certain species of cultivated fruits and vegetables are accompanied by persistent weeds species.

### *Indicators*

- Area covered by activities contributing to environment and biodiversity protection (certain percentage of organic and agrotourism holdings) – around 100 ha.

## 2.5 Impact of fruit and vegetables sector on landscape

Landscape protection is closely related to biodiversity protection, where it takes the form of protection of habitats that are essential for wild species survival.

It is estimated that half of the environment resources is combined with agricultural landscape. Compared to several West European countries, landscape environment is well preserved in Poland, in particular in the north-eastern part of the country. A considerable part of Poland's landscape, shaped throughout centuries, with a colourful mosaic of fields with various crops, field boundaries, dirt roads, hedgerows, forests and natural water basins, is well preserved. The aforementioned landscape elements create a perfect hiding place for numerous species of our fauna and flora. Moreover, numerous bird species hatch in those habitats. Intensive horticultural and fruit growing production, functioning within the landscape and exploiting its natural resources, may significantly transform such landscape – especially in the case of fruit growing and vegetable growing under cover. Vast areas covered by orchards, monocultural plantations of fruit shrubs or greenhouses for vegetable growing change the landscape and reduce visibility.

Another threat is posed by construction of buildings for agricultural purposes, such as warehouses, storehouses and cold stores, but also greenhouses and other facilities, which all can distort open landscape. When built on migration routes, they can also disturb migration corridors. Moreover, greenhouses can be very harmful for the environment because of devices which emit light supporting cultivation.

#### *Indicators*

No common baseline indicators were defined for the objective 'Landscape conservation'.

## **2.6 Impact of fruit and vegetable sector on climate change**

Man-caused global warming is one of the key problems of environmental protection in the 21<sup>st</sup> century. Even though burning of fossil fuels is the main cause of global warming, agriculture has contributed significantly to the intensification of the process – 12 – 14% of all man-caused greenhouse gases emission comes from agricultural activities. Horticultural production is a source of the emission of two greenhouse gases, namely carbon dioxide and nitrous oxide.

Vegetable growing under covers requires combustion of considerable amount of fossil fuels, thus contributing to negative climate changes. In comparison to other European countries, due to the very cold winter climate, vegetables growing under cover in Poland requires a higher input of fossil fuels.

Coal is the most frequently used fuel for warming crops grown under cover in Poland; various combustion boilers are used for this purpose, most frequently pulverized coal-fired boilers. In 90% of the holdings, low-efficiency boilers are used (below 70%) without dedusting systems, very often utilising worst quality coal (price factor), with a significant amount of sulphur. However, the increasing price of coal (especially coal with low sulphur content), together with other factors such as ecological exhaust emission requirements, the low efficiency of the coal-fired boilers (which are difficult and expensive to operate), and also a considerable loss of heat resulting from limited capacity to quickly adjust heating output in coal boilers, have all forced the greenhouse and foil tunnel owners to search for more affordable, reliable and convenient sources of heat. Because the most convenient and ecological sources, based on gas fuel combustion, are usually unavailable (natural gas – due to insufficient gas networks, liquid gas - due to significant input required and high operating costs), the producers usually turn to heavy fuel oil. This kind of oil<sup>5</sup> is used in almost 600 ha

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<sup>5</sup> Heavy fuel oil – oily residue obtained from distillation of low-quality petroleum – heating value: 9900-10700 kcal/kg

of crops cultivated in greenhouses (out of over 2000 ha of overall greenhouse crop cultivation area). Average annual consumption of heavy fuel oil in horticultural production is estimated at about 250-300 thousand tonnes.

It is calculated that maintaining a temperature higher than 20°C in winter requires 3–5 MW of heating output for every hectare of thermo-isolated facilities, or 4–6 MW/ha<sup>-1</sup> - if there is no isolation.

Transport is another factor related to growing vegetables under cover which has an impact on the climate change. However, it is less relevant when compared to heating.

### *Indicators*

Two common baseline indicators were defined within the objective 'Climate change mitigation':

- Estimated annual consumption of energy for greenhouse heating purposes by type of energy source (Tonnes/Litres/m<sup>3</sup>/Kwh per tonne of marketed production)
- Estimated annual consumption of internal transport purposes by fuel type (Litres/m<sup>3</sup>/Kwh per tonne of marketed production)

Available sources do not provide relevant data which could be used to determine those two indicators. It is very difficult to estimate annual energy consumption by type of energy source per product unit - the range is very broad, e.g.: from 15 kg of coal for 1 kg of early strawberries grown under cover to 1 kg of coal or 2 litres of natural gas for 1 kg of tomatoes grown under cover.

There is no data available which could be used to determine the transport indicator. Producer organisations arrange the transport of their goods in various ways, e.g. they can use services of subcontractors or arrange their own transport. Emission of greenhouse gases in the context of transport is considered negligible.

Rough estimates regarding energy consumption for heating of covered cultivation areas by energy sources are available; however, there are no figures indicating what part of production is related to particular energy source. It is essential to compare the size of production with the level of energy consumption; therefore, energy consumption expressed in Kwh per tonne of production under cover will be used as an indicator.

Annual energy consumption per tonne of production: 20000 Kwh/tonne of vegetables grown under cover ≈ 72000 MJ/tonne of vegetables grown under cover ≈ 2.5 t of (hard) coal/tonne of vegetables grown under cover.

Having in mind the increasing prices in Poland, producers are highly interested in energy-saving activities. This is a potential that should be exploited.

## **2.7 Impact of fruit and vegetable sector on waste management**

Horticultural production is a source of organic and non-organic waste. Hazardous waste cause also specific risk for this sector.

Organic waste from horticultural holdings includes: leaves, branches, bark, cut grass, removed weeds, rotten or poor quality fruit and vegetables, peelings (where fruits and vegetables are peeled before processing).

Non-organic waste includes: packaging, municipal waste, broken elements of machinery, unused means of production which are not considered hazardous, and other.

Among plastics used in vegetable and fruit growing, the most frequently used are polyethylene (low and high density) and polypropylene. Low density polyethylene is used, among others, for mulching or covering plants and tunnel structures. High-density polyethylene is used for packaging and for elements of irrigation system, whereas polypropylene can be found in containers and so called agro agrotexiles (coverings for soil and plants).

Production of greenhouse vegetables (tomatoes, cucumbers, peppers) is mostly based on the use of cubes, made from mineral wool or other non-organic material covered with plastic (seedling bags). After two or three vegetative periods, the mineral wool cubes are removed. Greenhouse floors are very often covered with plastic so as to increase the reflection of natural light or protect lettuce seedlings from dirt. Such plastic covering are usually replaced after each vegetative period. Seedling stems of tomatoes, cucumbers and peppers are wrapped with a biodegradable string which means that after their vegetation, the plant material can not be disposed of as green waste. Plastic residues from this material pose a serious problem because they are stored by the producers in windrows for a long period of time.

Hazardous waste includes: unusable pesticides, packaging of chemical agricultural products, machine oils, batteries, used fluorescent lamps, etc.

#### *Indicator*

No common baseline indicators were defined for objective 'Reducing the volume of waste generated'.

## **2.8 Conclusions**

As the above analysis shows, the impact of horticultural sector on the environment is considerable. In Poland, because of the intensity of fruit and vegetable production, this sector influences the quality of environment to a greater extent than other agricultural production sectors (with the exception of intensive and industrial animal production). Thus, supporting actions aimed at reducing the impact, as well as promoting the preservation of environmental resources should be considered as a priority in this sector.

The impact of fruit and vegetable sector on the environment is mainly the effect of use of fertilizers and pesticides, use of water for irrigation, consumption of energy for heating, and of waste generated during production processes.

A variety of actions can be introduced with the aim to limit the negative environmental impact of horticultural production. Some of them are relatively simple and undemanding in term of costs, while others require research and innovation.

The efficiency of producer organisations in implementing specific actions in individual areas should be an important factor when choosing the area of activity. It means that a given activity must help in solving a certain problem in the sector, and also be related to production and sales. Selected actions must address the real problems affecting the environment but also be feasible for the producers.

Taking the above into consideration, the following relevant areas of activity, which are important for the society and include the most important production factors, were identified:

- **Soil protection:** Soil processing is of key importance in fruit and vegetable production, since it may lead to decomposition of soil structure and to the loss of organic matter. The problem occurs most frequently in vegetable production, as such production involves intensive soil processing. In-row cultivation of vegetables may lead to water outflow and formation of erosion rows. Actions aimed at improving soil structure and protecting it from erosion may be undertaken, such as: conservation tillage and mulching.
- **Climate change mitigation:** Energy consumption is very high in certain parts of fruit and vegetable sector. Energy is necessary to produce vegetables in Polish climate. However, investment in new and more efficient equipment, which should significantly reduce gas emission, is the top priority for producer organizations.
- **Water saving:** Efficiency of irrigation can be considerably boosted by investing in new technologies. Irrigation systems used in fruit growing are particularly efficient. Big, mobile sprinklers used in production of field vegetables are also efficient. However, they are less economical in terms of water consumption.

Due to climate changes and trends towards sustainable management of water resources, the implemented actions should be aimed at developing and applying cost effective irrigation and fertilising techniques in field cultivation of vegetables. Current field cultivation technologies, both intensive and sustainable, can be easily used to incorporate water saving irrigation techniques. Wide row spacing enables application of localized irrigation systems (microirrigation and drip irrigation), which require less water than sprinklers.

- **Preservation of water quality:** Intensive production of fruit and vegetable sector results in high use of fertilizers and pesticides. This can lead to severe local water pollution. Reduction of nitrogen and pesticides usage in horticulture should contribute to preserving water quality. Therefore, supporting producers in this area should be a priority. Additionally, this objective involves a purely operational aspect and can be dealt with by means available in each agricultural holding.
- **Preserving natural habitats and biodiversity:** Increasing intensification of vegetable and fruit growing can negatively influence the biodiversity of local fauna and flora. Producer organisations should, therefore, focus on preserving as much as possible biodiversity and habitats and, at the same time, on improving production efficiency.
- **Waste management:** Fruit and vegetable production processes generate large amounts of waste. Producer organisations could reduce the impact of this waste on the environment by switching, at least partially, to environment-friendly packaging. The amount of waste could also be minimised by using recyclable, reusable and/or biodegradable materials.

### 3. STRATEGY AND OBJECTIVE SELECTION

The initial analysis of the fruit and vegetable sector has allowed to specify six action areas, in which producer organisations can participate effectively. In order to identify the priority environmental areas of action, it was necessary to consider, together with the capabilities of producer organizations, other factors that can condition effectiveness of the environmental efforts made.

Environmental actions cannot stand in contradiction to other objectives that a producer organisation needs to fulfill (such as fruit and vegetable production and sales at prices that ensure the best income possible to its members). The action area needs to supplement the EU and national programmes on agriculture and environment. It is also important to coordinate environmental efforts with other environmental actions. Finally, the action area needs to contribute to the general environmental objectives of the EU. Environmental requirements for producer organisations are indicated in Article 103f of Council Regulation (EC) No 1234/2007<sup>6</sup> and include consistency, complementarity and conformity:

- **Consistency:** It is important to achieve consistency between the environmental objectives pursued and other objectives of the national strategy. Where possible, environmental efforts should be synergic – and not counteract – with actions serving other objectives of the producer organisations (e.g. competitiveness).
- **Complementarity:** Environmental actions implemented under the operational programmes must complement other national, regional or local actions and measures related to the environment and agriculture undertaken with the contribution of Community or national funds.
- **Conformity:** It is important that the selected objectives are in conformity with the general environmental objectives of the European Union.

As already stated in the previous part, **soil protection, water quality preservation, sustainable use of water resources, biodiversity and biotope protection, climate change mitigation and enhanced waste management** are the six main challenges for the sector. It is described below how the main areas meet the requirements in terms of consistency, complementarity and conformity.

### 3.1. Consistency

From the purely environmental perspective, there is no doubt that a greater concentration of efforts in the six priority areas identified will exert a positive impact on the environment.

Pursuing objectives in those six priority areas may also be expected to contribute to other objectives of producer organisations' activity, however.

One of the main objectives of supporting producer organisations is to make them more competitive. Recently, there has been an increase in environmental awareness of the consumers. Therefore, an information that a given product has been produced with due respect for the environment becomes a valuable asset. In the same way, a reduction in the amount of waste generated by the sector has automatically resulted in a fall in disposal costs. Moreover, consumer awareness of environmental problems related to waste generation has been increasing. A label on a product informing that its production process is environmentally friendly may encourage consumers to buy the product. To sum up, an optimal use of environmental resources will probably create a competitive advantage.

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<sup>6</sup> Council Regulation (EC) No 1234/2007 of 22 October 2007 establishing a common organisation of agricultural markets and on specific provisions for certain agricultural products (Single CMO Regulation) (OJ L 299 of 16.11.2007, p. 1).

### 3.2. Complementarity

Producer organisations' environmental efforts are intended to complement other efforts made at national, regional or local level, with the contribution of EU and national funds.

The general support for the benefit of rural development is provided by the Rural Development Programme (RDP). The aims of axis 2 polish RDP 2007-2013 are: improving the condition of the environment, nature and landscape throughout the rational land management. The eligible actions for support on agri-environmental programme include *inter alia*: restoring value or maintaining status of precious habitats which are used in agriculture and preservation biodiversity on rural areas, promotion of sustainable management system, appropriate soil use and water protection, protection of endangered local varieties of cultivation plants. This approach is very wide and covers a number of actions, many of which cannot be implemented in the fruit and vegetable sector. A more sector-specific approach may be found within the Thematic Axis 1 of the RDP 2007-2013. It includes plans of support for innovation and development of the basic agricultural economy and the processing sector. The above two programmes may also support projects involving the promotion of technological development in vegetable growing. Also axis 3 of RDP 2007-2013, which contributes for the creation and development of micro-enterprises may complement support for horticultural sector in Poland. The aid scope in this action covers *inter alia* processing of agricultural products, or storage and preservation of such products.

As mentioned in the initial analysis, the greatest share of the fruit and vegetable sector in biodiversity protection is the reduction of nitrogen, phosphorus and pesticide leaking and those actions may be complementary to other environmental programs and measures.

### 3.3. Conformity

Pursuant to the EU regulations, actions included in the national framework for environmental protection need to be in conformity with the general objectives of the common environmental policy of the EU (Article 103f (1) of Council Regulation (EC) No 1234/2007). It applies in particular to objectives listed in Article 191 of the Treaty on the Functioning of the European Union (OJ C 115 of 09.05.2008, p. 1) and the Sixth Environment Action Programme of the European Community<sup>7</sup>.

Article 191 of the Treaty specifies the following general objectives of the EU policy on the environment:

- preserving, protecting and improving the quality of the natural environment,
- protecting human health,
- prudent and rational utilisation of natural resources,
- promoting measures at international level to deal with regional or worldwide environmental problems, particularly to fight against the climat changes.

The environmental action programmes of the European Union provide guidelines for the European policy on the environment. The Sixth Environment Action Programme of the European Community focuses on several areas, with a special emphasis on four priority areas related to the following objectives:

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<sup>7</sup> Established by Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 (OJ L 242 of 10.09.2002, p. 1)

- mitigating climate change,
- protecting nature and biodiversity,
- preserving environment, health and quality of life,
- promoting sustainable use of natural resources and management of wastes.

The selected six priority areas of action correspond to the objectives set out in Article 191 of the Treaty and the Sixth Environment Action Programme of the European Community:

- Reducing greenhouse gas emissions and promoting energy efficiency will serve the objective of mitigating climate change.
- Soil protection (by preventing erosion and/or contamination) and preserving biodiversity and natural habitats will contribute to protecting nature and biodiversity.
- Preserving water quality (by preventing pollution from fertilizers and/or pesticide residues) and water saving will help preservation of environment, health and quality of life.
- Improved management of waste will contribute to a more sustainable use of natural resources and reducing the volume of waste generated.

On the basis of the priority areas of activity selected, specific objectives have been established so that the evaluation of operational programmes could be based on specific and measurable elements. The objectives have been set on the basis of what seems to be achievable in a particular area.

<b>Action area</b>	<b>Specific objective</b>
Soil protection	Increasing the area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented.
Climate change mitigation	Encouraging energy saving and efficiency in fruit and vegetable production under cover, thus also contributing to a significant reduction of greenhouses gas emissions.
Water saving	Extending the area under fruit and vegetable production where water saving measures are applied.
Preserving water quality	Increasing the area under organic production or other practices aimed at reducing the use of fertilisers and/or pesticides, so as to reduce risks of water pollution from nutrient and pesticide used in fruit and vegetable growing,
Natural habitat and biodiversity preservation	Increasing the number of fruit and vegetable producers who completely eliminate or reduce the use of chemical means.
Waste management	Reducing the volume of waste associated to the fruit and vegetable production.

#### **4. ENVIRONMENTAL ACTIONS**

The list of environmental actions eligible for support within the identified priority areas is provided in chapter 4.4. The list is not exhaustive. Chapter 4.4 also indicates, for each environmental action selected, the specific commitment or commitments entailed (i.e.



the specific requirements to be complied in order to be eligible for support) and the justification of the action based on its expected impact in relation to the environmental priority concerned.

Chapter 4.1 indicates the general requirements that the environmental actions selected under an operational programme have to comply with in order to be eligible for support. In addition to the said general requirements, the environmental content of the operational programme as a whole is also subject to some requirements, which are described in detail in chapter 4.2. Chapter 4.3 indicates the general rules applicable in relation to the level of support that can be provided for environmental actions.

#### **4.1. General requirements for environmental actions selected within an operational programme**

For an environmental action to be eligible for support, the following general requirements need to be fulfilled:

1. **Compliance with the national framework for environmental actions:** First of all, the environmental actions selected needs to be compliant with the national framework for environmental actions. It means that the environmental action needs to fall within one of the abovementioned areas of action and to fulfil all the conditions (environmental justification, commitments entailed, documentation accompanying the operational programme, confirmation of expenditure) indicated for one of the actions listed in Chapter 4.3.
2. **Compliance with the requirements related to agri-environment payments specified in Article 39(3) of Council Regulation (EC) 1698/2005<sup>8</sup>.** It means that support for the environmental actions covers only those commitments, which goes beyond the following baseline/reference requirements:
  - a. the relevant mandatory standards established pursuant to Articles 5 and 6 and Annexes II and III of Council Regulation (EC) No 73/2009<sup>9</sup>;
  - b. the minimum requirements for fertiliser and plant protection product use as established by the national legislation<sup>10</sup>;
  - c. other relevant mandatory requirements established by the national legislation<sup>10</sup>.

Baseline/reference requirements may change during the implementation of the operational programme. In such a case, the support to environmental actions selected under the operational programme may be modified accordingly. It also needs to be emphasized that if an action previously approved as an environmental action becomes mandatory, it can no longer be regarded as an environmental action.

3. **Compatibility with other environmental actions:** Actions granted for support should be compatible and complementary with other environmental actions implemented under the operational programme, and with agri-environment

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<sup>8</sup> Council Regulation (EC) 1698/2005 of 20 September on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) (OJ L 277 of 21.10.2005, p. 1).

<sup>9</sup> These requirements correspond to the requirements to be respected by farmers receiving direct payments under the Common Agricultural Policy.

<sup>10</sup> pursuant to the regulation of the Minister of Agriculture and Rural Development of 26th of February 2009 on particular conditions and way of awarding financial support for measure “Agri-environmental measure” established by Rural Development Programme 2007-2013 (Dz. U. No. 33, item 262 with further amendments).

commitments supported under the Rural Development Programme, which is implemented by the members of the producer organisation.

4. **Level of support:** Where an operational programme entails the possibility of combining different environmental actions and/or where the environmental actions selected under the operational programme may be combined with agri-environmental measures supported under the Rural Development programme, the level of support must take account of the specific income foregone and additional costs resulting from the combination.
5. **Duration of an environmental action:** The duration of an action should be sufficient to ensure that environmental benefits can be acquired. If the national framework includes an environmental action (other than investments) which is similar to an agri-environment action included under the Rural Development Programme (e.g. actions the duration of which significantly affects their effectiveness, i.e. the achievement of expected environmental benefits), the same duration should be applied as in the case of the agri-environment action concerned. If the duration of an operational programme is shorter (i.e. 3 or 4 years) than the above mentioned duration, a producer organisation is obliged to continue a given environmental action under a subsequent operational programme, except for duly justified reasons, and in particular based on the results of the mid-term evaluation of the operational programme provided for in Article 127(3) of Commission Regulation (EC) No 1580/2007.

#### 6. **Durability of investments**

In the case of investments, the commitments entailed include the obligation to ensure the maintenance and use of the fixed assets purchased as intended in the approved operational programme for a minimum period of:

- 10 years since purchase or return to use of constructions and buildings,
- 5 years since purchase of equipment and machinery.

In above mentioned period producers organisation is not allowed to sell or to let<sup>11</sup> the environmental investments to other entities.

7. **Significance of environmental benefits resulting from an action:** For an investment in new equipment or machines to be considered as an environmental action, it seems appropriate to require that it contributes to a minimum level of improvement in terms of environmental benefits. The investment needs to ensure an improvement of at least 25% compared with the pre-existing conditions (for instance, in terms of water consumption, energy efficiency, emission of air pollutants) over the depreciation period of the investment, lasting at least 5 years. In some cases a lower threshold might be acceptable, provided that the investment would bring other, unambiguously determined, environmental benefits. This threshold could not be lower than 10% for each separate environmental benefit. In case of implementation of the environmental action in members holdings, effectiveness of improving environmental conditions should be measured in respect of a baseline situation in members holdings during implementation of the action. The verification of the minimal conditions for eligibility should be performed *ex ante*, on the basis of the expected performance of the investment as indicated in technical specifications provided by the producer organisation and certified by an independent qualified expert or body (i.e. Voivodship Inspectorates for Environmental Protection, Regional Directorate for Environmental

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<sup>11</sup> referring to article 61(6) of Commission Regulation No 1580/2007.

Protection, Main Inspectorate of Plant Health and Seed Inspection, organisation units for environment in local government units, research centres or laboratories, experts from Polish Chamber of Ecology), taking into account technical parameters. If a lower level of improvement than the one above is expected, the action will not be considered an environmental action.

## 4.2. General requirements concerning the environmental content of an operational programme

Pursuant to Article 103c (3) of Council Regulation (EC) No 1234/2007, Member States shall provide that operational programmes shall include two or more environmental actions, or at least 10% of the expenditure under operational programmes shall cover environmental actions. Poland has set the requirement that producer organisations need to implement at least two environmental actions.

Environmental initiatives undertaken by producer organisations in Poland need to correspond to the six action areas identified above (see chapter 3).

Together with the general requirements indicated in Chapter 4.1, environmental actions covered by an operational programme will also have to comply with the following requirements:

- **Balance:** When approving an operational programme of a producer organisation, a main criterion will be whether the selected environmental actions reflect the various types of environmental impact caused by producer organisations. In the case of carrying out diverse activity, the planned actions shall refer to all its main directions and may not focus on one direction only. Nevertheless, if it can be proven that the production of a given producer organisation brings a particular, significant, negative impact for the natural environment, and if proven that this one is much more significant than other impacts, then the planned actions may be directed mainly at this impact. However, a producer organisation will not be allowed to take only one action of a given type.
- **Range:** Producer organisations need to implement at least two environmental actions. However, they can decide to implement more actions under an operational fund. These actions may be implemented within one or more of the priority environmental areas indicated in Chapter 3.

If a producer organisation wishes to implement an environmental action that is not included in the National Framework, the PO should notify it and submit the following information to the Ministry of Agriculture:

- 1) the justification for action based on its expected environmental impact;
- 2) the degree of consistency with the objectives and priorities defined in the National Framework;
- 3) A description of the commitment or commitments entailed by the action, and the related duration.

These items of information provided will be the basis for the possible introduction of the action in a revised version of the National Framework. Pursuant to Article 58, paragraph 1 of Regulation (EC) No 1580/2007, proposed modifications to the National Framework have been notified to the European Commission and are subject to the procedure laid down in Article 103 f, paragraph 1, second subparagraph, of Regulation (EC) No 1234/2007.

- **Common nature:** Environmental actions need to be common. As already mentioned, an organisation meets environmental requirements by implementing two environmental actions. However, it is not enough to take two actions in two separate agricultural holdings. The PO's must ensure that an environmental action involves more than 50% of the members of the producer organisation. In other words, a project needs to be common to be eligible for support.

**The application of indicators:** The application of indicators is an integral part of the implementation of the national strategy for sustainable operational programmes. It aims at facilitating verification of whether there is a connection between the actions taken and the results achieved, and whether the results achieved are significant. Although the indicators will not provide a final answer to the question of whether an action has contributed to the improvement of the environment quality (at the national or regional level), they should contribute to answering the question of whether an action has been effective and whether it has reduced the negative impact on the natural environment (locally).

Performance indicators used in national environmental framework, referring to actions aimed at environmental protection, extends the common set of indicators listed in Annex XIV of Commission Regulation (EC) No 1580/2007 to additional indicators reflecting national and regional needs, conditions and targets of operational programs based on article 126(4) of Commission Regulation (EC) No 1580/2007.

Types of indicators:

- **Baseline indicators** – they are intended to facilitate the analyses of the initial situation at the start of an operational programme, for example by giving the number of producer organisations' members who are involved in organic production, or the size of area covered by actions aiming at nitrate reduction, etc.
- **Input indicators** – they register whether an action has been launched and calculates the expenditure per type of action (PLN or EUR).
- **Output indicators** – they register the scope of action. It can be expressed in many ways. Thus, they specify the number of agricultural holdings in which an action has been launched, the size of areas on which an action is implemented or the number of actions completed.
- **Result indicators** – they serve to evaluate the result of the actions in terms of environmental benefits achieved, for example by indicating the reduction in the amount of water or fertilisers applied per hectare or energy used per ton of marketed production in a given year.
- **Impact indicators** – they help to evaluate the general impact of action, for example by indicating the total change in the consumption of mineral fertilisers or in the use of water or energy, etc.

A quantitative presentation of the amount of the expenditure made, the scope and the results of an action will facilitate an appropriate evaluation of actions completed. For example, an action may have an excellent result indicator in terms of the reduction of nitrogen application per hectare, but if the output indicator shows that an action is not extensively implemented, the general impact will be marginal. The final evaluation of action is based on the analysis of all information provided by five types of indicators.

### **4.3. General rules applicable concerning the level of support to environmental actions**

Although a producer may apply for support for a given (e.g. environmental) action under both the RDP 2007-2013 and the operational programme of the producer organisation of which he/she is member, a beneficiary may receive support for a given action only under one scheme (pursuant to the first sub-paragraph of Article 60 (2) of Commission Regulation (EC) No 1580/2007).

As regards the possible risks of double funding, due to the overlapping of environmental actions covered by this framework with certain measures included in Poland's Rural Development Programme, the criteria and administrative rules applied in Poland's Rural Development Programme, aimed at ensuring that a beneficiary may receive support for a given operation only under one scheme, are covered in detail in other parts of the Poland's National Strategy for sustainable operational programmes (pursuant to the second sub-paragraph of Article 60 (2) of Commission Regulation (EC) No 1580/2007).

As regards the level of support, the following general requirements apply:

- If an action is eligible also under the RDP 2007-2013, the level of support shall not exceed that applicable for the measures under that programme (pursuant to the third sub-paragraph of Article 60 (2) of Commission Regulation (EC) No 1580/2007). Support for environmental actions, other than acquisition of fixed assets, shall be limited to the maximum amounts laid down in the Annex to Regulation (EC) No 1698/2005 for agri-environment payments. This condition does not apply to environmental actions which do not relate directly or indirectly to a particular parcel (in accordance to article 60(2) subparagraph 4 and 5 of Commission Regulation (EC) No 1580/2007);
- For operational programmes implemented in Poland and approved on the basis of the provisions of Council Regulation (EC) No 1234/2007 and Commission Regulation (EC) No 1580/2007, in each case it is possible to receive support only to the level of 60% of expenditures incurred for environmental actions;
- Support for environmental actions will cover additional costs and income foregone resulting from a given action (pursuant to the fourth sub-paragraph of Article 103c (3) of Council Regulation (EC) No 1234/2007).
- Under no circumstances can financing be granted to the same action under several support programmes and operational programmes need to be accompanied by a written undertaking from the producer organisation indicating that it has and will not receive, directly or indirectly, any other EU or national funding in respect to the actions qualifying for aid (pursuant to Article 62 (c) of Commission Regulation (EC) No 1580/2007).
- According to the second sub-paragraph of Article 61(3) of Commission Regulation (EC) No 1580/2007, where investments are replaced, the residual value of the investments replaced shall be:
  - (a) added to the operational fund of the producer organisation, or
  - (b) subtracted from the cost of the replacement.

## **4.4. Eligible actions**

The following chapter provides the list of environmental actions that, within the identified priority environmental areas, are eligible for support under the operational programmes. Moreover, for each environmental action selected, it indicates the specific commitment or commitments entailed (i.e. the specific requirements to be complied in order to be eligible for support) and the justification of the action based on its expected impact in relation to environmental need and priority.

The list of environmental actions is not exhaustive. Producer organisations may propose the inclusion of new actions in the national framework, if they consider those actions to be better suited, in their case, to attain one or more of the general or specific environmental objectives within the priority environmental areas specified in Chapter 3. To this end, a producer organisation must supply the following details concerning the action proposed:

- 1) justification of the action, based on its expected environmental impact in relation to the environmental priority defined in the National Framework for environmental actions;
- 2) the extent to which the action proposed is consistent with the aims and priorities of the National Framework for environmental actions;
- 3) a description of the commitment or commitments entailed by the action, and their duration;
- 4) the proposed amount and intensity of the support;
- 5) the inter-relationship with other measures and any constraints on implementation;
- 6) the supporting documentation required.

A competent public authority will evaluate whether to accept or refuse the proposal put forward by the producer organisation on the basis of the details provided. Where appropriate, those details will also be used as the basis for including the new action in an amended version of the National Framework for environmental actions. In accordance with Article 58(1) of Regulation (EC) No 1580/2007, amendments made must be communicated to the European Commission and are subject to the procedure set out in the second subparagraph of Article 103f(1) of Regulation (EC) No 1234/2007.

The following measures are eligible for support under operational programmes:

### **1. Soil protection**

- 1.1 Actions aimed at improving and maintaining good soil condition.

### **2. Climate change mitigation**

- 2.1. Systems reducing emissions of greenhouse gases and other pollution to the atmosphere.
- 2.2. Investments in new energy-efficient technology.
- 2.3. Development of renewable energy systems.

### **3. Water saving**

- 3.1. Application of water use reduction systems.
- 3.2. Application of systems measuring the actual irrigation needs.
- 3.3. Application of closed water circuits.

### **4. Improving water quality**

- 4.1. Replacing old, traditional spraying equipment or its components with new, more environmentally-friendly ones.
- 4.2. Construction of wastewater treatment facilities.
- 4.3. Application of biological plant protection methods.

### **5. Natural habitat and biodiversity preservation**

- 5.1. Introduction of natural methods of plant pollination.

### **6. Waste management**

- 6.1. Creating waste composting systems.

### **7. Measures in support to environmental actions**

- 7.1. Horizontal action: training, advisory services, water and plant analyses relating to environmental protection.

Below is a detailed description of the above measures eligible for support:

#### **4.4.1. Actions aimed at improving and maintaining good soil condition.**

The main objective of actions in this area is to maintain the high production potential of agricultural soils, especially by reducing the exposure of soil to erosion. In Poland, a significant part of the territory is at risk of water and air erosion. In these areas fruit and vegetables should be grown in such a way as to mitigate the risk of erosion processes.

The risk of erosion can be mitigated by adopting appropriate agricultural practices such as conservation tillage and mulching inter-rows in fruit and vegetable cultivation by organic mulch. In order to carry out this kind of treatment special equipment and machinery the use of which does not influence the structure and condition of soil is necessary. These measures may be undertaken in members' holdings.

#### ***Indicators:***

Baseline indicator: area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented (ha)

Input indicator: expenditure incurred (zł)

Output indicator: number of hectares covered by the measure (ha)

number of holdings participating in the action

Result indicator: Estimated change in annual area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented (ha)

Impact indicator: Estimated change in the total area under fruit and vegetable production at risk of soil erosion where anti-erosion measures are implemented (ha)

#### ***Commitments:***

1. purchase of a specialised machinery and equipment necessary to implement agricultural practices and/or activities aimed at improving and maintaining good soil condition to prevent soil erosion (e.g. for conservation tillage and mulching) and going beyond the GAEC standards and other obligatory requirements established by the national legislation, and;
2. maintenance and use as intended of the machinery and equipment purchased for the minimum duration of 5 years (see Chapter 4.1 point 6)

Eligibility for support is limited to commitments that ensure a minimum effectiveness for environmental improvement. This means increase in the area under fruit and vegetable production that is no longer at risk of soil erosion (on which there are anti-erosion measures applied) of at least by 25% compared to existing conditions, for a period of minimum 5 years. Achievement of the minimum threshold must be certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to the purchase of a specialised machinery and equipment necessary to improving and maintaining good soil condition.

**Level of support:** Total expenditure for the investments made.

**Documentation accompanying the operational programme:** A statement on the number of members involved in the action, along with the specification of areas covered by the measure. A written statement of estimated expenditure. A description of the implementation method, and of the expected environmental benefits resulting from the implementation, certified by an independent qualified body or expert.

**Confirmation of expenditure:** Invoices for the investments made, (machinery and equipment) along with a written statement that the measure implemented (a) has contributed or is contributing to improve environmental conditions and (b) exceeds GAEC standards and other relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2).

#### **4.4.2. Systems reducing emissions of greenhouse gases and other pollution to the atmosphere.**

In Poland the production of energy, for example for greenhouse heating purposes, frequently involves a high level of greenhouse gas emissions to the atmosphere. Obsolete heating technologies, most often relying on hard bituminous coal or fuel oil as fuel, emit large amounts of hazardous gases and pollution into the atmosphere. Therefore, it is important to enable the modernisation of the existing heating systems in order to reduce the negative environmental impact of fumes (for example by installing boilers fired with more environmentally-friendly fuels, or chimney filters).

These measures may be undertaken in members' holdings and/or on the premises at the disposal of producers organisation.

##### **Indicators:**

Baseline indicator: estimated annual greenhouse gas emissions (m<sup>3</sup>)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action

number of actions undertaken

total value of investments made (zł)

Result indicator: estimated change in annual greenhouse gas emissions (m<sup>3</sup>)  
Impact indicator: estimated change in total greenhouse gas emissions (m<sup>3</sup>)



**Commitments:**

- Purchase and installation of a heating system replacing an existing one, or;
- Purchase and installation of equipment contributing to reduction of emission of greenhouse gases and other pollution to the atmosphere emitted by existing heating system, and;
- Maintenance and use as intended of the equipment put in place for the minimum duration of 5 years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure a minimum effectiveness for environmental improvement. This means at the least 25% reduction in energy use and in emissions of greenhouse gases. A lower threshold of 10% might be acceptable, provided that an investment is expected to bring other environmental benefits (e.g., use of renewable energy sources, reduced emissions of air pollutants) (see Chapter 4.1 point 7). The minimum threshold must be certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to the purchase and installation of a heating system or equipment contributing to reduction of emission of greenhouse gases and other pollution to the atmosphere emitted by existing heating system, including installation project.

**Level of support:** Total investment expenditures. In the case of replacement of existing heating system, its residual value shall be subtracted from the cost of the action.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure and estimated reduction in greenhouse gas emissions. A description of the implementation method, and of the expected environmental benefits resulting from the implementation, certified by an independent qualified body or expert.

**Confirmation of expenditure:** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improve environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.3. Investments in new energy-efficient technology.**

The implementation of methods of efficient energy management by final users is highly significant for climate change mitigation. Horticultural production is frequently conducted in a non-energy efficient way, there is a lack of automatic control systems, building materials do not have appropriate systems of thermal insulation, non-energy efficient sources of light, machines and equipment are applied, etc.

This type of action includes purchasing new technologies specifically aimed to reduce energy consumption. Energy consumption in greenhouses can be reduced, and thus climate changes mitigated, for example by double glazing them, applying laminated coated glass, or assembling thermal-insulating, shading and energy-saving movable screens. Energy consumption in greenhouses can be also reduced as a result of energy storing by applying heat exchanger systems. Heat accumulated in a greenhouse can be stored: in greenhouse equipment components, in walls isolating a greenhouse from the inside, as well as in greenhouse floors, accumulation tanks, and small indoor water containers.

The above measures may be undertaken in members' holdings and/or on the premises at the disposal of producers organisation.

**Indicators:**

Baseline indicator: estimated annual consumption of energy for greenhouse heating purposes by type of energy source (tonnes/litres/m<sup>3</sup>/kWh per tonne of marketed production) or estimated annual consumption of energy used for heating of buildings at the disposal of producers organisation, by type of energy source (tonnes/litres/m<sup>3</sup>/kWh per tonne of marketed products)

Input indicator: expenditure incurred

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made

Result indicator: estimated change in annual consumption of energy by type of energy source or type of fuel (tonnes/litres/m<sup>3</sup>/Kwh per tonne of marketed production/products)

Impact indicator: estimated change in total consumption of energy by type of energy source or type of fuel (tonnes/litres/m<sup>3</sup>/Kwh)

**Commitments:**

- Purchase and installation of equipment and installations aimed at energy savings replacing the existing ones; or
- Purchase and installation of equipment contributing to better use of energy by existing heating systems and;
- Maintenance and use as intended of the equipment and installations put in place for the minimum duration of 5 years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure a minimum effectiveness for environmental improvement. This means at the least 25% reduction in energy use and in emissions of greenhouse gases. A lower threshold of 10% might be acceptable, provided that an investment is expected to bring other environmental benefits (e.g., reduced emissions of air pollutants) (see Chapter 4.1 point 7). The minimum threshold must be certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to the purchase and installation of an equipment and installations aimed at energy savings or equipment contributing to better use of energy by existing heating systems, including installation project.

**Level of support:** Total investment expenditures. In the case of replacement of existing equipment and installations, their residual value shall be subtracted from the cost of the project.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure and estimated energy saving. A description of the implementation method, and of the expected environmental benefits resulting from the implementation, certified by an independent qualified body or expert.

**Confirmation of expenditure:** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improve

environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.4. Development of renewable energy systems.**

Another significant method of reducing greenhouse gas emissions is to replace fossil fuels with renewable energy sources. Poland has an enormous technical energy potential relying on generating and using energy from renewable sources. Due to high investment costs, however, it is not widespread.

Renewable energy sources may and should originate mainly in rural areas with local sources of renewable energy (for example agricultural waste biomass), where centralized energy acquisition systems are not sufficiently available and do not ensure the desired quality and quantity of energy or fuel supply. Therefore it is necessary to support replacement of existing heating installations with new installations able to run on renewable sources of energy.

These measures may be undertaken in members' holdings.

##### ***Indicators:***

Baseline indicator: estimated annual consumption of energy for greenhouse heating purposes by type of energy source (tonnes/litres/m<sup>3</sup>/Kwh per tonne of marketed production)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action

number of actions undertaken

total value of investments made (zł)

Result indicator: estimated change in annual consumption of energy by type of energy source or type of fuel (tonnes/litres/m<sup>3</sup>/Kwh per tonne of marketed production)

Impact indicator: estimated change in total consumption of energy by type of energy source or type of fuel (tonnes/litres/m<sup>3</sup>/Kwh)

##### ***Commitments:***

- Purchase and installation of heating equipment and installations able to run on renewable energy sources, replacing an existing one; and
- Maintenance and use as intended of the heating equipment and installations put in place for the minimum duration of 5 years (see Chapter 4.1 point 6).

***Eligible expenditures:*** Expenditure related to purchase and installation of heating equipment and installations able to run on renewable energy sources, including installation project.

***Level of support:*** Total investment expenditures. In the case of replacement of existing equipment and installations, their residual value shall be subtracted from the cost of the project.

***Documentation accompanying the operational programme:*** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated amount of energy generated from renewable sources.

***Confirmation of expenditure:*** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improving

environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2).

#### **4.4.5. Application of water use reduction systems.**

The application of artificial irrigation of fruit and vegetable crops becomes, to an increasing extent, the factor ensuring satisfying yield in terms of both its quantity and quality. In some cases the measures taken by horticultural holdings in this regard are ineffective and involve excessive water consumption.

In fruit and vegetable growing, there is a significant possibility of implementing water saving methods and technologies. The specific nature of initiatives taken will vary depending on the subsector concerned (e.g. fruit trees vs. vegetables) and the specific local conditions (sloping and irregular field vs level surface). In many cases, sprinkling irrigation can be replaced with drip irrigation. Drip irrigation is more efficient in terms of water and energy consumption (as a result of lower pressure) and it allows to constantly maintain the optimum level of soil humidity and aeration. It also does not exert a negative impact on the soil structure and reduces the risk of plant diseases. There also exist computer-controlled irrigation techniques which make the amount of water conditional on the ground humidity.

The application of appropriate agricultural practices facilitates a rational use of water necessary for plants to grow and yield. The soil should preserve the appropriate structure to be able to absorb rainwater so that plants could use it during the dry periods. The preservation of the appropriate soil structure by applying various practices, such as mulching or shallow soil loosening, minimizes the risk of water intake by other weeds or other plants.

These measures may be undertaken in members' holdings.

##### ***Indicators:***

Baseline indicator: area under fruit and vegetable production where water saving measures are applied (ha)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made (zł)

Result indicator: estimated change in annual water consumption/hectare ( $\text{m}^3 \cdot \text{ha}^{-1}$ )

Impact indicator: estimated change in total water consumption ( $\text{m}^3$ )

##### ***Commitments:***

- Purchase and installation of water saving irrigation systems replacing the existing ones, or;
- Purchase and installation of new equipment contributing to lower water consumption by the existing irrigation systems and;
- Maintenance and use as intended for the new irrigation system and equipment installed for a minimum duration of five years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure a minimum effectiveness for environmental improvement. This means at the least 25% reduction in water use. A lower threshold of 10% might be acceptable, provided that an investment is expected to bring other environmental benefits (e.g., reduced soil erosion, reduced use of fertilisers) (see Chapter 4.1 point 7). The minimum threshold must be certified *ex ante* by an independent qualified body or expert.

The investment cannot lead to an increase in the irrigated area.

***Eligible expenditures:***

Expenditure related to purchase and installation of water saving irrigation systems or equipment contributing to lower water consumption by the existing irrigation systems, including installation project.

The water saving irrigation systems mean modern installations that enable rational use of water necessary for plants to grow and yield (such as drip irrigation).

Equipment contributing to lower water consumption by the existing irrigation systems means appliance that enables to control the irrigation frequency, the irrigation timing and the volumes of water distributed.

***Level of support:*** Total investment expenditures. In the case of replacement of an existing irrigation system, its residual value shall be subtracted from the cost of the project.

***Documentation accompanying the operational programme:*** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated water saving, and of the expected environmental benefits resulting from the implementation, certified by an independent qualified body or expert.

***Confirmation of expenditure:*** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.6. Applications of systems measuring the actual irrigation needs.**

Investments in equipment measuring the actual irrigation needs may contribute to a significant increase in water saving and its more rational consumption. For example, in vegetable field crops the amount of water applied on a one-off basis while sprinkling should be adjusted to the field water capacity of soil and the intended depth of moisture. In greenhouse crops, the schedule of (drip) irrigation of plants, in soilless crops in particular, should be defined on the basis of the previous water use or the amount of energy provided.

These measures may be undertaken in members' holdings and is eligible only in combination with the action described in the previous section 4.4.5.

***Indicators:***

Baseline indicator: area under fruit and vegetable production where water saving measures are applied (ha)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action

number of actions undertaken

total value of investments made

Result indicator: estimated change in annual water consumption per hectare ( $m^3 \cdot ha^{-1}$ )

Impact indicator: estimated change in total water consumption ( $m^3$ )

***Commitments:***

- Purchase and installation of the equipment and installations needed for measuring the actual irrigation needs; and
- Maintenance and use as intended of the equipment and installations installed for the minimum duration of five years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure reduction in water use of at the least 25%, certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to purchase and installation of the equipment and installations needed for measuring the actual irrigation needs, including installation project.

**Level of support:** Total expenditure investment.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated water saving, certified by an independent qualified body or expert..

**Confirmation of expenditure:** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### 4.4.7. Application of closed water circuits.

In addition to systems reducing the consumption of water obtained directly from the natural environment, in some case it is possible to save water by applying closed water circuits. For example, the water used for washing before marketing fruit and vegetables, can be returned after washing and reused, after filtering, for retrial fruit and vegetables washing. In greenhouses, the following can be installed: rainwater collection and storing systems or water recirculation systems for irrigation, however producers organisations which wash their fruits and vegetables before marketing can reverse water after washing and after previous filtering they can use it another time.

The above measures may be undertaken in members' holdings and/or on the premisesat the disposal of producers organisation.

#### **Indicators:**

Baseline indicator: area under fruit and vegetable production where water saving measures are applied (ha), or

amount of water consumed by the amount of marketed fruits and vegetables ( $\text{m}^3 \cdot \text{t}^{-1}$ )

Input indicator: expenditure incurred

Output indicators: number of holdings participating in the action

number of actions undertaken

total value of investments made

Result indicator: estimated change in annual water consumption per hectar ( $\text{m}^3 \cdot \text{ha}^{-1}$ ) or

estimated change in annual water consumption in process of fruits and vegetables preparation for marketing ( $\text{m}^3 \cdot \text{t}^{-1}$ )

Impact indicator: estimated change in total water consumption ( $\text{m}^3$ )

**Commitments:**

- Purchase and installation of the equipment and installations necessary for creating closed water circuits, rainwater collection and storing systems or water recirculation systems for irrigation; and
- Maintenance and use as intended of the equipment and installations put in place for the minimum duration of five years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure reduction in water use of at the least 25%, certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to purchase and installation of the equipment and installations necessary for creating closed water circuits, rainwater collection and storing systems or water recirculation systems for irrigation, including installation project.

**Level of support:** Total investment expenditures.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated water saving, certified by an independent qualified body or expert..

**Confirmation of expenditure:** Invoices for the investments made, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.8. Replacing old, traditional spraying equipment or its components with new, more environmentally-friendly ones.**

The pesticides sprayed on crops, spread by the wind, may affect the adjacent area. Therefore, it is necessary to improve the spraying methods in order to prevent this from happening and reduce the usage of spray liquid. This can be done by replacing the old spraying equipment or its components (e.g. spraying nozzles) with new ones, less affecting the environment of the adjacent areas and more effective, and thus reducing the use of water and plant protection products.

These measures may be undertaken in members' holdings.

**Indicators:**

Baseline indicator: area under fruit and vegetable production where the reduced usage or better management of pest protection products has been applied (ha)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action

number of actions undertaken

total value of investments made (zł)

Result indicator: estimated change in annual usage of pest protection products (tonnes)

Impact indicator: estimated change in total usage of pest protection products) (tonnes)

**Commitments:**

- Purchase of a spraying equipment or its components replacing an existing one; and
- Maintenance and use as intended of the spraying equipment or its components purchased for a minimum duration of five years (see Chapter 4.1 point 6).

Eligibility for support is limited to commitments that ensure reduction in use of plant protection products of at the least 25%, certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to purchase of a spraying equipment or its components.

**Level of support:** Total investment expenditures.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated reduction in use of plant protection products, certified by an independent qualified body or expert..

**Confirmation of expenditure:** Invoices for the purchase of equipment, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant minimum and mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.9. Construction of wastewater treatment facilities.**

The horticultural production may be a significant source of wastewater (e.g. from fruit or vegetable washing, equipment rinsing and washing, etc.); therefore, it is necessary to reduce emissions of point source pollution in horticultural holdings. Where possible, it would be appropriate to link the construction of a wastewater treatment facility with an installation allowing to reuse the purified water in a holding (e.g. for plant watering).

The above measures may be undertaken in members' holdings and/or on the premises at the disposal of producers organisation.

**Indicators:**

Baseline indicator: amount of untreated wastewater which had been discharged prior to the implementation of the measure (m<sup>3</sup>)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made (zł)

Result indicator: estimated change in annual amount of untreated wastewater which is discharged (m<sup>3</sup>)

Impact indicator: estimated change in total amount of untreated wastewater which is discharged (m<sup>3</sup>)

**Commitments:**

- Purchase and installation of a wastewater treatment system; and



- Maintenance and use of the wastewater treatment system put in place as intended for the minimum duration of five years (see Chapter 4.1 point 6);

The minimum share of wastewater subject to treatment must be at least 25% of the total volume of wastewater produced, otherwise it is necessary to show a reduction by at least 25% of the total volume of not treated wastewater discharged. The minimum threshold must be certified *ex ante* by an independent qualified body or expert.

**Eligible expenditures:** Expenditure related to purchase and installation of a wastewater treatment system, including installation project.

**Level of support:** Total investment expenditures.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method with the estimated reduction in the amount of wastewater discharged, certified *ex ante* by an independent qualified body or expert.

**Confirmation of expenditure:** Invoices confirming the project expenditure, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented.

#### **4.4.10. Application of biological plant protection methods.**

Intensive fruit and vegetable production is largely dependent on the application of plant protection products. In the conventional horticultural production chemical plant protection products are applied which can have a negative impact on the natural environment. If fruit and vegetable producers want to apply more environmentally-friendly protection methods, they need to replace the chemical plant protection methods with biological ones. These methods involve using biological control (e.g. natural enemies) and/or other natural mechanisms, in replacement to chemical plant protection products, to combat diseases, pests and weeds of cultivated plants.

A method consists in using pheromones, i.e. chemical informers of insects within a given species, in traps and/or dispensers. Pheromone traps may be applied in order to attract and neutralise pests. Pheromone products may be also applied to reduce the population of pests of horticultural crops by interference in their reproduction process.

With a view to maintaining high yield and quality of fruit and vegetables, chemical plant protection products can be replaced by introducing beneficial organisms which are natural enemies of pests of such crops (predators and pest parasites), i.e. beneficial insects, nematodes, fungi, bacteria, and viruses.

These measures may be undertaken in members' holdings.

##### **Indicators:**

Baseline indicator: area where biological plant protection methods are applied (ha)

Annual amount of chemical plant protection products currently applied per hectare ( $\text{kg} \cdot \text{ha}^{-1}$ )

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made (zł)

Result indicator: estimated change in the annual production area covered by chemical protection methods (ha)

estimated change in the annual amount of chemical plant protection products applied per hectare ( $\text{kg}\cdot\text{ha}^{-1}$ )

Impact indicator: estimated change in the total production area covered by chemical protection methods (ha)

estimated change in the total amount of chemical plant protection products applied per hectare ( $\text{kg}\cdot\text{ha}^{-1}$ )

**Commitments:** Purchase and use as intended and with the producer recommendations:

- a) biological plant protection products listed in *The register of authorized plant protection products*<sup>12</sup>, or
- b) beneficial organisms which are natural enemies or competitors of horticultural crops pests, or
- c) materials supporting use of biological plant protection methods (i.e. glue boards, feeding products for beneficial organisms, biological products supporting plant resistance).

**Eligible expenditures:** Expenditure for the purchase of the biological plant protection products and materials, such as pheromones, pheromone traps and/or dispensers, predators and pest parasites, etc.

**Level of support:** Additional costs resulting from the action, determined on a real cost basis. The calculation of the additional costs will take into account possible cost savings resulting from the action (e.g. reduced volume of plant protection products used, reduced costs for their distribution), and possible income gained (e.g. from sale of repellent plants and pest-regulating plants if it occurred).

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method and expected environmental benefits.

**Confirmation of expenditure:**

1. Invoices for the purchase of biological plant protection products and materials.
2. A list of producer organisation members who undertook the action and the area where the action was undertaken.
3. A written statement that the producer organisation dispensed all the biological plant protection products and materials to its members and that these products and materials were used.

A written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2).

#### **4.4.11. Introduction of natural methods of plant pollination.**

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<sup>12</sup> Published by Minister of Agriculture and Rural Development.

Large area plantations of mainly single species dominate in fruit and vegetables production. Reduction of species biodiversity causes that pollinating insects that inhabit the area concerned, have no nutrition resources ensured over the whole activity period. As a consequence, they extinct or migrate. Moreover the reduction of biodiversity may cause disruption in ecosystem in whole region.

It is possible to prevent such adverse phenomenon by introduction pollinating insects naturally existing in the area concerned, such as honey-bee (*Apis mellifera L.*) and red mason bee (*Osmia rufa*). This also contributes to maintain and restore the local wild flora.

This measure may be undertaken in members' holdings.

**Indicators:**

Baseline indicator: area where measures contributing to the protection of habitats and biodiversity are implemented (ha)

Input indicator: expenditure incurred (zł)

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made (zł)

Result indicator: estimated change in the annual production area covered by natural pollination methods (ha)

Impact indicator: estimated change in the total production area covered by natural pollination methods (ha)

**Commitments:** Purchase or rent and use as intended hives with honey-bees (*Apis mellifera L.*) and hives/cocoons with red mason bee (*Osmia rufa*).

**Eligible expenditures:** Expenditure related to the purchase or rent of hives with honey-bees (*Apis mellifera L.*) and hives/cocoons with red mason bee (*Osmia rufa*).

**Level of support:** Total investment expenditure or expenditure for renting hives, however a possible income gain resulting from sale of honey must be deducted.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method and expected environmental benefits.

**Confirmation of expenditure:** Invoices for the purchase of hives with honey-bees (*Apis mellifera L.*) and hives/cocoons with red mason bee (*Osmia rufa*) or rental agreement of hives with honey-bees (*Apis mellifera L.*) and hives/cocoons with red mason bee (*Osmia rufa*) with a payment confirmation. A written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project specifying, among other things, the pollination efficiency.

#### **4.4.12. Creating waste composting systems.**

Composting is a process of decomposition of organic matter performed by aerobic microorganisms. The result of this process is compost which can be used to enrich soil with organic matter.

Some organic by-products and residues generated in horticultural holdings can be used to produce compost (damaged or sub-standard fruit and vegetables, peelings, residues from crop cultivation, etc.).

The development of composting systems requires investments – to prepare the location and purchase appropriate equipment.

The above measures may be undertaken in members' holdings and/or on the premises at the disposal of producers organisation.

**Indicators:**

Baseline indicator: annual amount of organic waste generated in the holdings which couldn't have been composted before the implementation of the measure started (tonnes)

Input indicator: expenditure incurred

Output indicators: number of holdings participating in the action  
number of actions undertaken  
total value of investments made (zł)

Result indicator: estimated change in the annual amount of organic waste generated which are not composted (tonnes per tonne of marketed production)

Impact indicator: estimated change in the total amount of organic waste generated which are not composted (tonnes)

**Commitments:**

- Purchase and installation of the equipment and installations necessary to create an organic waste composting system. The capacity of the composting system put in place must be proportionate to the volume of organic residues and by-products produced by the PO or its members, as certified by a qualified expert or body, and
- Maintenance and use as intended of the composting system put in place for a minimum duration of 5 years (see Chapter 4.1 point 6);
- Maintenance and use as intended of the installations in order to protect the groundwater and soil against leaking pollutants into groundwater or soil for the minimum duration of:
  - a) 10 years if it is construction,
  - b) 5 years in other cases (see Chapter 4.1 point 6), and
- Use by the PO's members or sale of the compost produced.

**Eligible expenditures:** Expenditure related to:

- purchase and installation of equipment necessary to create the composting system, including installation project, and
- purchase of the materials and set up the installation intended for protection of the ground water and soil against leaking pollutants, or building such installation.

Expenditures related to the collection of the organic materials to be composted and their delivery to the composting installation put in place are not eligible for support.

**Level of support:** Overall expenditures incurred for the actions reduced by income gained from sale of compost if it occurred.

**Documentation accompanying the operational programme:** A statement on the number of members who are expected to be involved in the action. A statement of estimated expenditure. A description of the implementation method and expected environmental benefits. A description of the capacity of the composting installation to be put in place, with the

indication that it is proportionate to the volume of organic residues and by-products produced by the PO or its members, certified by a qualified expert or body.

**Confirmation of expenditure:** Invoices for expenditure incurred, along with a written statement that the measure implemented (a) has contributed or is contributing to improving environmental conditions and (b) exceeds the relevant mandatory requirements established by the national legislation (see Chapter 4.1 point 2). Technical documentation of the project implemented. Documents proving the effective use or sale of the compost produced.

#### **4.4.13. Horizontal action: training, advisory services, water and plant analyses relating to environmental protection.**

Fruit and vegetable producer organisation usually do not possess sufficient knowledge to choose the technological solutions aimed at environmental protection, which are optimal for them. Therefore, in certain cases solutions are implemented which prove not sufficiently effective or whose operational costs are very high. It is desirable, thus, that environmental advisory services are used and possible options analysed so as to select those measures and technologies which will ensure a high level of environmental protection.

If implemented alone, horizontal actions do not have any environmental impact directly; therefore they cannot be selected as environmental actions to be implemented independently under operational programmes. However, in order to implement or enhance the effectiveness of certain environmental actions, it may be necessary to conduct horizontal actions as well. Horizontal actions can thus be included in the operational programmes only and always in connection with environmental actions having direct environmental implications in order to contribute to the implementation of those actions and to their effectiveness. Those measures may be undertaken for the benefit of members' holdings.

The measure aims at ensuring that environmental actions undertaken by producer organisations will be conducted professionally. For training, advisory or analyses services to qualify as environmental actions, the following criteria need to be met:

- a) They are intended to accompany and be associated with other (real) environmental actions that have a direct effect on the environment, which must therefore be included in the operational programme and are specifically targeted to reinforce the effects of these measures.
- b) Their implementation is entrusted to additional (internal or external) qualified personnel. The operational programme must clearly indicate the specific tasks that the additional qualified personnel is required to perform.
- c) The scope of other training actions and advisory and analyses services envisaged in the National Strategy explicitly excludes similar purposes.
- d) Advisory services, training services and analyses may be implemented jointly or alone and be connected to different (real) environmental actions.

#### **Indicators:**

Baseline indicator: number of persons, who attended a training/training programme in the period of last 3 years, or;

number of holdings, PO's/APO's members benefiting from advisory services

Input indicator: expenditure incurred (zł)

Output indicator: number of holdings involved in the measure

Result indicator: number of persons who attended a full training service/ full training programme,

number of holdings benefiting from advisory services

Impact indicator: n.d.

***Commitments:***

- Using (internal or external) qualified personnel to perform activities of training and/or advice; and/or
- water and/or plant analyses.

For eligibility for support, the measure implemented must complement (i.e. accompany and be associated with) one or more environmental actions described in Chapters 4.4.1 to 4.4.12, and must be targeted to reinforce the effects of those actions.

***Eligible expenditures:*** Cost of the working time of the qualified personnel used and expenditure for the water and/or plant analyses.

***Level of support:*** Total action expenditure. In the event the training or advisory services were provided by an employee of the producer organisation, and for the members of the producer organisation, the related wage of the PO's employee is determined on the basis of the work time registration.

Expenditure on qualified personnel and analyses may not exceed 30% of the total expenditure related to the environmental action that they are intended to complement, incurred in the whole programme implementation period. In case of implementation of the environmental actions that do not require continuation, horizontal actions, which complement them, should be undertaken only in the implementation years.

***Documentation accompanying the operational programme:*** A statement on the number of members who are expected to be involved in the action. A statement indicating the estimated expenditure. A document indicating the scope and reasons of the planned training or advisory services and the specific tasks that the qualified personnel is required to perform, and providing evidence that the allocation of the additional (internal or external) qualified personnel to these tasks is necessary to the implementation of an environmental action and/or to the effectiveness of that action.

***Confirmation of expenditure:*** Detailed documents showing the actual number of working hours and specific tasks performed (in the case of use of an employee of the producer organisation) or invoices (in case of a contract with an external training or advisory service or in case of water and plant analyses).