



BeePro: Rational use of plant protection products and fertilizers
in terms of the impact on bees in the ecosystem
Project no. 2021-1-SK01-KA220-VET-000025257



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the European Union**

BeePro State-of-the-Art Transnational Report

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The BeePro State-of-the-Art, Transnational Report, is one of the results of the project “BeePro: Rational use of plant protection products and fertilizers in terms of the impact on bees in the ecosystem” The main aim of the project is to update and improve knowledge and awareness of VET students, VET organisations, farmers and people working in the farm production area in the field of organic beekeeping and proper usage of the chemical plant protection products and fertilisers, by means of the creation of Curriculum and Interactive training content, focused on organic beekeeping and development of interactive training materials and tools on organic apiculture and rational use of plant protection products.

This transnational report contains crucial information about the current threats, necessities, abnormalities in the agriculture in relation to bees in all partner countries as well as in Europe. It consists of 2 main parts: PART 1: DESK RESEARCH and PART 2: ONLINE SURVEY. The findings of this report serve as a basis for the elaboration of further project results, in particular the BeePro Curriculum, the Virtual Learning Environment with Training Content and the BeePro Handbook.



PART 1: DESK RESEARCH

Introduction

The honey bee has a very important position in the cycle of natural life. According to the Food and Agriculture Organization (FAO), bees pollinate 71 out of 100 crops, which account for 90% of the world's food. Without pollinators, up to 20,000 plant species in Europe would probably become extinct in a short time. This would reduce biodiversity and disrupt the ecosystem and the food chain. Thus, the existence of human being would also be seriously endangered.

That is why it is important that we prevent the mass death of bees that has taken place around the world in recent years. Bees need to be seen as a bioindicator of the state of the environment - where bees die, sooner or later it will also affect human health.

The availability and quality of bee grazing on a global scale has changed dramatically, especially over the last half century due to the advent of intensive agriculture.

Examples of changes in agriculture include the advent of artificial fertilizers, the massive use of herbicides, the application of nitrogen fertilizers, which support the growth of grasses at the expense of flowering plants, pastures etc.

1. Theoretical background of beekeeping in relation to chemicals

CYPRUS

In Cyprus, the outrageous and illegal use of pesticides have a series of negative effects on beekeeping. Unfortunately, a lack of education, poor pesticide management, and a lack of competent authorities exacerbate this massive problem of bee extinction. The agriculture ministry announced that any spraying of products that are toxic to bees during the flowering stage must be avoided. However, only few farmers took this into consideration. In addition to this some farmers` believe that bees can spread disease and this is absolutely invalid information. In recent years, there has been extensive reference to the threat that bees receive worldwide from the reckless use of pesticides and some insecticides



such as neonicotinoids. Unfortunately, it is rare to find a correlation between the death of bees and the use of agriculture products in the studies that have been done in Cyprus.

According to the European Commission, Cyprus is experiencing difficulties implementing EU pesticide laws. The Commission identified prominent issues and non-compliances. In 2019, a 'European Food Safety Authority' report revealed that Cyprus ranks at the top in terms of EU pesticide residues in food. **Cyprus reported to has allowable maximum residue level (MRL) which is over the 5.7%** of the legally permitted foods or animal feeds. Residue issues arise because there is lack of control on farmers over how pesticides are applied or how much pesticide is purchased. The farmers are using an "excessive amount of pesticides" because they believe that using more will produce better results. Indeed, this leads us to the main problem: a **lack of education**.

According to EUROSTAT, Cyprus **increased total sales of pesticides by 101%** between the years of 2011 and 2019. This is regarded as a **highest increase in the EU**.

The Cyprus Department of Agriculture has launched a "name and shame" policy, which entails the public disclosure of producers who use illegal pesticides and the imposition of administrative fines.

SLOVAKIA

At present, high attention is paid to the health status and beekeeping itself. In addition to diseases or parasites, one of the factors influencing the condition of hives and other pollinators are plant protection products, i.e. pesticides used to protect plants, plant products or the removal of undesirable vegetation and, to a lesser extent, plant protection aids.

Every plant protection product or plant protection aid used in the Slovak Republic must be authorized and labelled in the Slovak language. The label contains all the information that must be strictly observed so that the application of the product does not adversely affect the bee colony.

More than 160 different types of pesticides have been detected in the hive environment, with three neonicotinoids (thiamethoxam, imidacloprid and clothianidin) and two organophosphates (phosmet and chlorpyrifos) being considered the greatest risks to bees worldwide.

A new danger threatening the health of bees will also be the possible application of nanoparticles in agriculture, e.g. in the production of fertilizers or pesticides. Sublethal factors, which do not individually have significant harmful effects, can cause a total collapse of the colony when acting together. Simultaneous action of some fungicides together with neonicotinoids or pyrethroids can



increase their toxicity up to a thousandfold. Neonicotinoid residues are found not only in pollen and nectar of treated crops, but also in adjacent vegetation, in puddles and other water surface visited by bees and in rivers in agricultural areas. This group of pesticides poses a risk not only to bees but also to other species such as butterflies, birds and aquatic insects, which are important components of higher food chains.

The Member States of the European Union, including Slovakia, have decided to limit the pesticides with the most negative impact on hives. This step is to help the long-term unfavourable trend of declining bee population not only in Slovakia but also in the whole of Europe.

Prohibited chemicals

The European Commission has recommended the addition of a total of 3 substances collectively labelled neonicotinoids to the list of banned substances. These are the substances listed:

- thiamethoxan
- clothianidin
- imidacloprid

ROMANIA

Neonicotinoids

In Romania, beekeepers are among the most vehement opponents of these substances. Every year, they see an increasing mortality rate in apiaries. Beekeepers are just beginning to enjoy the fact that bees have recovered after the winter. In April, fruit trees and rape begin to bloom. The beekeepers hope that the bee families will be empowered well enough to make the acacia harvest, which immediately follows this period, fruitful.

The hope of many is simply shattered by the situation in which they go to the apiary and find their dead bees in front of the beehive. More treacherous in this situation is when the bees show no visible symptoms of toxicity. Beekeepers only notice that bee families are not developing, regardless of the technology in the apiary. Here in the second situation, there are many accusations against insecticides containing neonicotinoids. The fact that they kill gradually, without the typical symptoms of insecticide poisoning.



At this time, in Romania, neonicotinoids are still used only in seed treatment. This is only due to repeated derogations, obtained from Brussels. Most likely, in the near future, these exemptions will no longer be offered.

Spraying with products that contain neonicotinoids and that are not safe for bees, are no longer done in the vegetation or during the vegetative rest period. Among the last products that contained neonicotinoids and that could be used in spraying, during the vegetative rest period, we can mention Confidor Oil or Nuprid Oil. These products had the active substance imidacloprid and were among the best known in this segment. Their marketing and use has been banned.

SPAIN

Exposure to a mixture of compounds could pose a greater threat to pollinators' health than the action of a single active substance, as synergies between them can multiply their harmful effect. But there is a lack of studies and data on the possible negative effects of these combinations.

All these alterations in the behaviour and physiological aspects of the bees do not lead to an immediate death of the animal, or to the collapse of the colony, but have negative consequences on their long-term survival and conservation. A number of fungicides, such as ergosterol inhibitors may increase the toxicity of insecticides by reducing the detoxification capacity of bees.

Also in the case of bees that are frequently treated with veterinary products for the control of parasites such as *Varroa destructor*; it is known that acaricides used in colonies can act synergistically with insecticide residues present in the hives.

Another important interaction of insecticides is with pathogens. Both neonicotinoids and fipronil have an immunosuppressive effect on bees, making animals exposed to these insecticides more susceptible to infection with the *Nosema* pathogen. Immune weakening can also promote the spread of *Varroa* in hives, which transmits pathogenic viruses to bees. The combination of the parasite with these systemic insecticides unleashes the virulence of these diseases, contributing decisively to hive collapse.

Herbicides do not have acute toxicity to pollinating insects (Sánchez-Bayo and Goka 2014), although their use has been reported sometimes as a threat to insect pollinators. For example, exposure to the herbicide glyphosate (at concentrations of 10 mg/L in the laboratory) can alter the learning and navigational ability of bees, and auxin herbicides such as 2,4-D (at high concentrations of 1000 mg/L)



interfere with the development of their larval stages. The use of herbicides often indirectly affects pollinators by eliminating numerous wild plants and reducing floral diversity in agricultural areas.

Finally, the effect of fungicides has been little studied, but residues of these compounds in hives are known to be related to the prevalence of diseases in bees. Currently, loss of bees and other pollinators is very important and due to the fact that the use of pesticides has been identified as one of the agents involved in this decline, a reduction in their use is a necessary measure to avoid further consequences.

Not using insecticides in particular would not reduce crop productivity much. The application of pesticides with long persistence and water solubility should be avoided because of their high probability of movement to neighbouring areas.

Moreover, the use of systemic insecticide-treated crop seeds is a preventive treatment mode contrary to EU-recommended Integrated Pest Management, as it is applied without knowing whether the crop will be attacked by the pests or not. Close monitoring of pest populations and the use of alternative pest control methods in order to use pesticides only when strictly necessary could greatly reduce this risk of environmental contamination and exposure of pollinators and other non-target organisms that inhabit these environments.

For pesticides applied in aerosol form, their use should be limited to times when the risk of contact with pollinators is lower, such as at night. Also, spray application should be avoided as far as possible during the flowering season of cultivated plants and wild plants growing in the vicinity.

POLAND

In Poland, the greatest number of pollinator poisonings are observed during rapeseed flowering, particularly in the period of control of the rapeseed strawberry, as well as in orchards and on potato and cereal plantations where weed control is carried out during flowering. If flowering weeds or honeydew are present, the crop should be treated as a flowering crop.

The causes of bee poisoning in Poland are mainly due to the mistakes of treatment providers, the most serious of which are:

- failure to comply with the provisions of the use label,
- incorrect choice of plant protection products and doses,
- incorrect timing of chemical protection treatments,
- incorrect treatment technique,



- the use of plant protection products not authorised for the crop concerned,
- lack of preparedness of treatment providers,
- use of non-recommended mixtures of plant protection products.

In order to avoid and prevent bee poisoning

- treatment should only be carried out if the harmful organisms have exceeded the economic damage thresholds, and treatment should be limited to marginal strips or hot spots where the harmful organisms occur,
- strictly observe the information on the label of the plant protection product,
- where scientific results are available, use reduced doses and split doses to reduce the chemicalisation of agriculture,
- select selective agents that are non-toxic to bees or that have a short precautionary period for use where bees are likely to forage,
- treatment should be carried out in the evening, after the bees have finished their flight,
- Many flowering weed species already provide bees with food from early spring onwards, e.g. the common starflower, and treatments must be treated in the same way as when the crop is in flower,
- do not spray honeydew-covered plants,
- with very toxic or bee-toxic products, do not apply to crops likely to flower before the end of the prevention period,
- prevent spray drift, especially onto adjacent flowering crops and where pollinators may be foraging, do not spray in strong winds,
- inform beekeepers of plant protection treatments carried out,
- not to pollute waters, such as drainage ditches, mid-field reservoirs and others, with plant protection products, as these may provide a source of water for pollinators,
- comply with legal provisions.

The holder of land or facilities where plant protection products are used by a professional user shall keep records for a period of 3 years on the plant protection products used on the land or facilities.



2. Beekeeping experiences in relation to the plant protection and fertilization

CYPRUS

The Panacyprian Ecological Agricultural Association stated that excessive and illegal use of pesticides has been on the rise in Cyprus, which has serious effects on the bee colonies and beekeeping.. They also point out that the path we are following might cause unrecoverable consequences. Some areas have experienced a population loss of up to 85%.

In 2018, beekeepers have complained to the Department of Agriculture regarding the possible bee poisoning caused by spraying on crops, mainly citrus and other fruit trees, during the flowering stage in March-April.

Besides plant protection products, beekeepers are also struggling with bee diseases. The most common threats to beehives in Cyprus are Acari Varrora and Nosema, which can cause serious damage to beehives. Unfortunately, there is no registered medicine for the Nosema ceranae parasite.

Most beekeepers believe that bee-eater birds are one of the the main obstacle. During the autumn migration passage in August and September, beekeepers shoot the bee-eaters even though it is prohibited.

In the context of the National Action Plan, professional users are required to inform all those who may be affected by the implementation of plan protection products in beforehand and to provide details such as time, product type, area, and toxicity level. Sadly, not everyone in Cyprus follows the rules. At the end of the day, farmers' actions affect beehives and beekeepers, and it is impossible to track down the source because it could be the fault of any resident within a 2-kilometer radius.

SLOVAKIA

The availability and quality of bee grazing in Slovakia and on a global scale has changed dramatically, especially in the last half century due to the advent of intensive agriculture. Examples of changes in agriculture include the advent of fertilizers that have pushed pulses out of cropping practices, the massive use of herbicides to prevent the growth of flowering weeds in fields and their edges, mowing of fodder before they flourish to increase protein content, application of nitrogen fertilizers to growth-promoting pastures grasses at the expense of flowering plants and the like.



At present, the Slovak Beekeepers' Association is working with BeeLife to promote a change in the Common Agricultural Policy to reflect the protection of pollinating insects.

One of the possibilities for cooperation between farmers and beekeepers is the promotion of the BeeFriendly trademark, by which certified farmers undertake to comply with the rules for the protection of pollinators, such as limited use of pesticides or mowing of crops after their flowering.

It would be naive to think that intensive agriculture will function without pesticides and biotechnology. However, there are also pesticides that are not based on synthetic poisons and bee-friendly farming systems. In recent years, there have been several civil protests in Europe, including Slovakia, over the excessive use of pesticides.

One of the promising and realistic solutions that radically reduce dependence on agrochemistry is the promotion of digital technologies and autonomous robots in crop production, which, in addition to reducing costs, significantly green plant production. These robots, already available on the market, make it possible to economically "survive" even smaller growers focused on organic production and less affected by the interests of multinational corporations.

ROMANIA

The reason why bees die in Romania:

Beekeepers observe the mortality in the apiary and immediately blame the neonicotinoids, when in fact the bees were killed by insecticides that have active substances of another chemical category.

In fact for many beekeepers neonicotinoids equals insecticides. This is totally incorrect. Insecticides have active substances from several chemical groups of substances, and neonicotinoids are just one chemical group from many others.

On all beekeeping groups, fruit growing, vegetable growing, products such as Biscay, Calypso, Mospilan are recommended as safe for bees. The product label also says they are safe for bees.

Pesticides can also be bought online, so this market has taken off.

The consequence of the free trade of pesticides is that anyone can use any kind of insecticide, at any time, without being able to verify it. Even if it is specified on a certain product that it does not apply during the flowering period, many do not take this aspect into account. People spray their flowering crops, and bees are hit hard when they do good and pollinate the crop.



Beekeepers notice mortality in the apiary and are tied to their hands, they can do nothing. It may be the fault of any resident, within a radius of about 2 kilometers. Today it can spray a neighbor 2 meters from the apiary, and tomorrow another 50 m or 2000 m. During the flowering period of fruit trees, beekeepers can always expect unpleasant surprises. It's frustrating that you can't even find out where the problem came from, who sprayed it with what and what.

In many cases, the damage is due to neonicotinoids, although they have not been used for years in spraying during the growing season. This is because for many beekeepers and not only, all insecticides are neonicotinoids.

SPAIN

Spain is now recognised as one of the world's leading honey producers, but bees here are also dying, due to a main set of causes.

The use of plant protection products in agriculture is considered one of the main causes of the decline of bees. Of particular concern are neonicotinoid insecticides, which act on the central nervous system of insects. Neonicotinoids are among the most widely used insecticides worldwide, but recently the use of some of them is being restricted and even banned in some cases in the EU due to the connection with colony collapse syndrome (CCS) or bee death.

Since 1985, parasitism by the allochthonous mite *Varroa destructor* has been considered the main threat to the survival of honey bees in Spain. This pathogen causes varroosis, a rapidly transmitted disease with devastating effects on colonies. Although survival rates follow a positive trend, mortality due to varroosis is still high.

Nosemosis (caused by *Nosema ceranae*, an allochthonous species that parasitises bees) is another disease with high prevalence in Spain that causes the continuous death of highly infected bees with clear effects on the population and productivity of the colonies.

Other threats. Combined sub-lethal effects from interactions between various plant protection products, together with nutritional deficiencies and the presence of pathogens, such as *Nosema ceranae* and *Varroa destructor*, can multiply the effect of these factors separately.

Spain is one the largest consumers of pesticides in the EU. Research shows that more than 100 different pesticide residues have been detected in bees, pollen, honey, wax and on beekeeping equipment.



So contrary to any attempt to enforce the Strategic Approach to International Chemicals Management (SAICM), and at least as far as transparency of environmental release of insecticide products is concerned, publicly available information is increasingly opaque. These organophosphate insecticides are of particular interest to beekeeping for several reasons: in the case of insecticides there is an obvious potential for off-target harm to pollinating insects such as bees, but even when insects are not the target (as in the case of fungicides and herbicides), they can be directly or indirectly affected by both the active ingredients and the supposedly inert ingredients (adjuvants, solvents, etc.) of commercial compositions.

Studies of pesticide residues in samples of honey, pollen and wax from relevant beekeeping areas of Spain reveal the enormous differences among regions about toxic environment in which insects develop depending on the agricultural pressures of the geographical areas. Regions with a more intensive agriculture have much bigger deaths of bees reported due to direct poisoning, in particular by organophosphate insecticides.

POLAND

The State Plant Protection and Seed Inspection, in cooperation with the Veterinary Inspection, takes official action when a suspicion of bee poisoning by plant protection products is reported. For this purpose, a committee may be appointed whose activities are to authenticate and clarify the fact. The committee may be composed of an employee of the Plant Protection and Seed Inspection, an employee of the Veterinary Inspection or a veterinarian in private practice, the owner of the apiary and a representative of the beekeeping organisation. The committee may optionally be also appointed by the municipal or local authority responsible for the incident of bee poisoning or by the person who is to become a member of the committee.

The committee's task shall be to collect the material for examination without delay, to preserve and send the samples to the laboratory. In addition, the members of the committee shall act within the scope of their competences:

- determine the number of colonies showing symptoms of poisoning,
- assess the health status of the apiary,
- establish the estimated amount of damage to the apiary,
- verify that the plant protection products on adjacent crops, where poisoning may have occurred, were used in a manner that could pose a risk to animal health,



- determine the owner of a plantation where plant protection products likely to be a source of contamination to bees have been used.

3. Brief description of significant case studies

CYPRUS

Park of the Pollinators

The two parks' construction activities began in October 2018 and were completed shortly before the end of the 2019. The European network EIT Climate-KIC funded the pollinator-strengthening activities as part of the project 'Plan for Nature-Based Solutions in Nicosia,' in which the Cyprus Energy Agency collaborated with the two municipalities. The projects' main goal is to improve urban biodiversity, particularly pollinators. That is, species that assist in the fertilization of flowering plants, allowing them to reproduce and fruit more abundantly. Special places for pollinators and birds, such as bee-hotels and bird-feeders, are placed and plantations that favor pollinator attraction are adapted, such as tremithkia, teratsia, lavender, and thyme. The signs are posted to inform and increase public awareness.

(<https://www.cea.org.cy/en/parko-epikoniaston-stoys-dimoys-st/>)

The Beekeeping Program

The Beekeeping Program (AP) 2020-2022 for the year 2022 has been announced by the Cyprus Agricultural Payments Organization in collaboration with the Department of Agriculture. The program's total budget is €339.000.

The European Agricultural Guarantee Fund and National Resources contribute half of the funding for the Beekeeping Program. The aim of the program is expected to contribute effectively to enhance the conditions of beekeeping product production and promote marketing by encouraging actions that are part of the program.



SLOVAKIA

The Community Bee Garden and the Department of Ecology of the Faculty of Humanities and Natural Sciences of the University of Prešov in Prešov are working together on research aimed at determining the degree of environmental contamination by heavy metals, using the so-called bioindicators - ie living organisms that are sensitive to changes in the environment. To this end, they have used the diligence and hard work of bees, which are becoming an endangered species.

As part of the project, beehives were placed on the bastion to draw attention to the important importance of bees and other pollinators for humans and the environment as a whole. The aforementioned Department of Ecology of the Faculty of Humanities and Natural Sciences of the University of Prešov also participates in the activities of the Community Bee Garden.

The author of the idea is the beekeeper Stanislav Kowalski, who in cooperation with the city of Prešov tries to point out the importance of bee protection.

During the first year of the existence of the Community Bee Garden in Prešov, several activities were carried out. The greenery on the individual floors of the bastion was removed, and raised beds with herbs and insect-loving plants were gradually created on the lower terraces. In cooperation with the University of Prešov in Prešov, scientific research and a professional beekeeping course are being carried out. At the end of the summer of 2019, the first Ecological Night at the Bastion took place, which was attended by 8 speakers and more than 90 spectators. During the year, the bee garden also served as an educational activity focused on ecology and environmental protection through lectures for primary schools.

ROMANIA

Organic Beekeeping

According to the results of a survey conducted on 433 Romanian beekeepers from the research paper “Organic Beekeeping Practices in Romania: Status and Perspectives towards a Sustainable Development” conducted in 2020-2021, 82% of the beekeepers stated that they were aware of the principles involved in organic beekeeping. When asked to specify some of these principles, the following keywords come into view: treatment, certifications, wax, organic, taxes, honeycomb, yearly, expensive, medicine. Of the respondents, 58.9% were unaware of the costs involved in practicing organic beekeeping. Moreover, the results of Chi-square test (p -value < 0.0001) showed that majority



of beekeepers who did not know the costs in organic beekeeping were in conventional or mixed beekeeping.

We should underline the fact that there was a category of beekeepers who use organic beekeeping practices, without being certified.

Moreover, beekeepers who indicated that their beekeeping was organic (fully certified, partially certified, and in conversion) were more associated with knowing organic principles, cost involved in practicing organic beekeeping, as well as they tend to think that organic beekeeping can bring benefits to the environment and agree with importance of creating “ecological beekeeping areas” for bees.

Neonicotinoid analyzes in Romania

In the magazine Apiarian Romania number 3/2018, the Romanian Beekeepers Association announced a series of actions carried out within the Research and Development Institute for Beekeeping. The role of the growing association was to develop a working protocol for the collection of samples of beekeeping biological material and nectar-pollen plants as well as their implementation through an experimental network of hives, placed on experimental plots, for rapeseed crops, sunflower. and corn, in the beekeeping season 2018.

SPAIN

Organic beekeeping.

According to the latest organic production statistics published by the Ministry of Agriculture, Fisheries and Food, Spain has a total of 278 farms dedicated to organic beekeeping, with 77,020 hives and a production level of 1,133,407 tonnes of honey. The autonomous communities or regions leading in organic beekeeping are Andalusia (92), Castile and Leon (39) and Galicia (35).

At regional level there are **regulatory entities for organic production that certify the organic honey**. They carry out regular checks on registered farms to monitor and evaluate compliance with the rules established for organic production of honey.

Ecological, organic or biological agricultural production is a production system with its own technical bases and regulations whose main objective is to obtain top quality foodstuffs without using synthetic chemical substances (pesticides, chemical fertilisers, etc.) or genetically modified organisms (known as GMOs or transgenic organisms).



There are different concepts that characterise organic beekeeping and which must be complied with, among others:

- The hives must be located in places where there are no sources of contamination within a radius of 3 km, no genetically modified crops and where no spraying is allowed.
- The feeding of bee colonies is only permitted in exceptional cases when extreme climatic conditions mean that the colony does not have sufficient reserves left. Honey, sugar or sugar syrup, all of which are organically produced, may be fed.
- Varroa can only be treated with non-chemical methods, thymol and organic acids: formic acid, oxalic acid and lactic acid.
- The wax must come from organic production.
- Materials such as plastic or resins, polyurethane or fibreglass may not be used for the construction of the hives.

EPILOBEE Project. Its application in Spain was implemented with the **annual pilot monitoring programmes on honey bee colony losses (2012-2017)** that have included the study of three neonicotinoid insecticides as important factors that can affect bee health.

National Action Plan for the Sustainable Use of Plant Protection Products 2018-2022. It includes among its objectives the promotion of Integrated Pest Management (IPM) to preserve a thriving agriculture, forestry and food sectors, ensuring a positive contribution to the environment, through a sustainable production model compatible with the rational use of plant protection products.

Other interesting case studies in Spain that we can mention are:

- ***Monitoring Programme of Bee Colony Loss***
- ***Network for the prohibition of Neurotoxic Pesticides***
- ***SOS Biodiversity- SOS Bees Platform.*** This citizens' platform was created to join forces to ban pesticides that are toxic for pollinators and to recover biodiversity.

POLAND

The State Inspectorate for Plant Protection and Seed Inspection is responsible for monitoring the proper use of plant protection products and should be contacted if any irregularities are found. In the case of a suspicion of bee poisoning in an apiary with plant protection products, follow the guidelines of the Polish Beekeeping Association. On the Polish Beekeeping Association's website



(<http://www.zwiazek-pszczelarski.pl>) there is information on the Code of Good Practice in Beekeeping, as well as on how to proceed in the event of a suspicion of poisoning and it is possible to download sample protocols according to which evidence should be collected.

Properly applied insecticides should not cause poisoning of bees, yet poisoning or intoxication of bees occurs very frequently in Poland. The main reason for this situation is a lack of awareness of the consequences of the improper use of plant protection products and, as a consequence, a disregard for regulations by those carrying out chemical treatments. It should be stressed that the use of all plant protection products requires a great deal of knowledge and responsibility on the part of those carrying out chemical treatments, as well as cooperation with and concern for apiary owners.

It is worth remembering that a farmer who has contributed to the poisoning or poisoning of bees is obliged to compensate for the resulting damage. Damage in the Civil Code is "a pecuniary loss as a result of a certain event". Damage caused by bee poisoning is the actual loss and the lost expected benefits which the beekeeper could have achieved. The injured beekeeper has the right to claim compensation, but in any case the beekeeper is obliged to collect and provide evidence of the losses incurred.

Plant protection is an integrated set of actions, not just chemical treatments. The Code of Good Agricultural Practice defines it as follows: "(...) integrated pest management is the combination of effective, environmentally safe and socially acceptable biological, agrotechnical and chemical methods of plant protection that keep pest populations below damage thresholds".

As recent years have taught us, the conflict between beekeepers and farmers is a win-win situation. The current legislation, the Integrated Pest Management and the Good Plant Protection Practices in force clearly define the ways of conducting it safely - but they must be strictly applied and enforced. The farmer must not be paid to break the law, and the beekeeper must have the tools to quickly identify the real culprit if there are losses in the apiary.



4. Institutions involved in regional or national systems and legislation

CYPRUS

Ministry of Agriculture CYPRUS

The Department of Agriculture implements the legislative and regulatory acquis which falls within its competence for fulfillment of Cyprus' obligations to the EU with independent and complete technocratic expertise whilst ensuring the production of qualitatively upgraded and safe agricultural products for the benefit of both producers and consumers. At the same time, it synthesizes with vision, inspiration, innovative practices and progressive suggestions for protection and promotion of the interests of the rural population through an integrated policy which incorporates realistic and reliable components of medium-term planning and strategic thinking in order to ensure the achievement of set objectives.

SLOVAKIA

The use of plant protection products in relation to bees is regulated by EU legislation as well as national legislation.

EU legislation:

- EC Regulation 1107/2009 concerning the placing of plant protection products (PPPs) on the market
- EC Directive 128/2009 establishing a framework for Community action to achieve a sustainable use of pesticides

National legislation establishing measures for the protection of bees in the application of plant protection products and auxiliary products in plant protection in the Slovak Republic regulates:

- § 2 of the Decree of the Ministry of Regional Development of the Slovak Republic no. 488/2011 Coll., Which lays down details on principles and measures for the protection of human health, sources of drinking water, bees, game, aquatic and other non-target organisms, the environment and special areas in the use of plant protection products



- § 8 of the Decree of the Ministry of Industry and Trade of the Slovak Republic no. 477/2013 Coll., Which implements the Act on Auxiliary Products in Plant Protection, plant protection products and auxiliary products in plant protection are designated as follows:
 - Vč 1 - Preparation toxic for bees
 - Vč 2 –Preparation harmful for bees
 - Vč 3 - A preparation with an acceptable risk for bees at the prescribed dose or concentration

In the Slovak Republic, they are in charge of risk assessment of plant protection products and their active substances as well as auxiliary plant protection products for bees and other non-target arthropods and propose risk reduction measures according to Act no. 405/2011 Coll. on phytosanitary care the following organizations:

- Institute of Beekeeping in Liptovský Hrádok
- National Reference Laboratory for Pesticides University of Veterinary Medicine and Pharmacy in Košice

Institute of Beekeeping in Liptovský Hrádok at the same time:

- keeps records of bee poisoning by plant protection products and auxiliary plant protection products and cooperates with other government departments in investigating the causes of bee death
- operates a toxicological information center for bees and pesticides for farmers, gardeners and winegrowers and beekeepers.

ROMANIA

Non-Governmental Organisations

Asociația Crescătorilor de Albine din România (Romanian Beekeepers Association)

- The Romanian Beekeepers Association is a professional beekeepers' organization, non-governmental, autonomous and apolitical, established for an indefinite period, being established in 1958.



- The Romanian Beekeepers Association aims to ensure the organizational framework and conditions that facilitate the development of a professional and amateur beekeeping at national level.

INSTITUTUL DE CERCETARE-DEZVOLTARE PENTRU APICULTURĂ S.A. - I.C.D.A (RESEARCH - DEVELOPMENT INSTITUTE FOR BEEKEEPING)

- Founded in 1974, it is a unit with complex activities of scientific research, technological development, production and extension, which is part of the structure of the Romanian Beekeepers Association.

Governmental Organisations and Programmes

The Ministry of Agriculture and Rural Development (MADR)

- MADR is the specialized body of the central public administration whose role is to develop, implement and monitor policies and strategies in the fields of agriculture, sustainable forest management and rural development, to ensure modernization and development of sectoral activities. and to ensure transparency and efficiency in the use of allocated funds.

National Agency for Animal Husbandry "Prof. Dr. G. K. Constantinescu" – A.N.Z

- The Agency is the national competent authority in the field of animal husbandry for the exploitation, breeding and reproduction of animals, state inspection in animal husbandry, control of milk producers and first-time buyers, conservation and sustainable management of animal genetic resources.

SPAIN

At national level

- Ministry of Agriculture, Fisheries and Food of the Government of Spain.
- Official Register of beekeeping farms in Spain,
- The Spanish Beekeepers Association
- Associated Ecological Beekeepers.
- Friends of the Bees Foundation
- Federation of Beekeeping Associations of Spain,



- Spanish Society of Organic Agriculture/ Spanish Society of Agroecology
- Agriculture, Agroecology and sustainable rural development.

In addition, there are many environmental and consumer associations (such as Greenpeace, Ecologistas en acción, SEO/Bird Life, WWF, Friends of Nature Association, Spanish Confederation of Consumers and Users, “Vivo Sano” Foundation, Fund for the defence of environmental health, etc.).

At regional level

- Department of Agriculture, Livestock and Rural Development of Junta de Castilla y León.
- More than 100 associations and cooperatives of beekeepers at local, provincial or regional level, all over the country, such as: Association of Beekeepers of Leon, Galician Beekeeping Association, etc.
- Regulatory entities for organic beekeeping.

LEGISLATION:

- **Royal Decree 209/2002 of 22 February 2002 laying down rules for the management of beekeeping holdings.** It establishes the basic rules regulating the application of health and zoo-technical management measures for beekeeping farms, as well as the conditions for the location, settlement and movement of hives, etc.
- **Royal Decree 930/2017, of 27 October, which regulates the economic aid scheme for beekeeping in the framework of the annual national programmes**
- The EU has support tools for the beekeeping sector under **Regulation (EU) 1308/2013 and its implementing provisions** (Delegated Regulation 2015/1366 and Commission Implementing Regulation 2015/1368). The regulations governing organic beekeeping are contained in Regulation (EC) 2092/91 on organic production of agricultural products and indications referring to agricultural products and foodstuffs.
- **Royal Decree 1311/2012, of 14 September, which establishes the framework for action to achieve a sustainable use of plant protection products.**



POLAND

Key legislation related to good plant protection practice:

- Regulation No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (OJ L 309, 24.11.2009, p. 1, as amended)
- Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (OJ L 309, 24.11.2009, p. 71)
- Act of 8 March 2013 on plant protection products (Journal of Laws 2017, item 50)
- Regulation of the Minister of Agriculture and Rural Development of 18 April 2013 on the requirements for integrated plant protection (Journal of Laws 2013, item 505)
- Regulation of the Minister of Agriculture and Rural Development of 31 March 2014 on the conditions for the use of plant protection products (Journal of Laws 2014, item 516)
- Ordinance of the Minister of Agriculture and Rural Development of 22 May 2013 on the procedure for the use and storage of plant protection products (Journal of Laws 2014, item 625)

5. Beekeeping protection services (performed or planned) and beneficiaries

CYPRUS

The Pancyprian Beekeepers Association (PBA) was founded in Cyprus in the 1980s with the mission of representing and training beekeepers, promoting and protecting beekeeping, and upgrading and modernizing beekeeping production facilities.

PBA established the Beekeeping School in 2009, Cyprus' only beekeeping educational institution.

Cyprus Agro Industry Center (CAIC) supports and assists individuals in setting up small agricultural businesses and small-scale industries. Apiculture is one their main themes where training is offered to potential beekeepers and apiculture enthusiasts.



The Cyprus Agricultural Payments Organization (CAPO) was established under Council Regulation (EC) No. 1258/1999 on the financing of the Common Agricultural Policy, of the European Union. According to Law No. 64(I) 2003, CAPO is an independent legal entity that does not come under any Ministry or Department of the Government.

SLOVAKIA

The priority of the management of the agro-department is to increase the system of protection of the life of the honey bee so that it is subject to agrotechnical procedures and the use of plant protection products.

The department wants to address protection systematically, from prevention through control to sanctions. The cornerstone of bee protection should be to closely monitor the use of plant protection products so that farmers cannot purchase these products in larger quantities than necessary and their application will have to be carried out with regard to bee life. Such an approach will generally help the healthier country and the environment.

ROMANIA

- **The national beekeeping program in Romania for the period 2020-2022 run by the Ministry of Agriculture and Rural Development**
 - The purpose of the National Beekeeping Program for the period 2020-2022 is to improve the production and marketing of bee products by providing beekeepers with financial support for the settlement of physico-chemical analyzes to certify the quality of honey and for the purchase of important things.
- **The National Sanitary Veterinary and Food Safety Authority (A.N.S.V.S.A.)**
- It functions as a regulatory authority in the sanitary-veterinary and food safety field, a specialized body of the central public administration, with legal personality, subordinated to the Government and under the coordination of the Prime Minister. The Authority's mission is to protect health throughout the food chain
- **Agency for the Financing of Rural Investments - AFIR**
- **Agricultural Payments and Intervention Agency (APIA)**



In case of legal problems and challenges, beekeepers should address the police department or seek justice in court.

SPAIN

In Spain, the legal framework for beekeeping programmes is defined by the Royal Decree 930/2017 of 27 October, which regulates the aid scheme for beekeeping in the framework of annual national programmes.

There is a **National Programme of aid measures for beekeeping in Spain 2020-2022**. Its main objectives are to improve the profitability of beekeeping farms, professionalise the sector, maintain the health of the hives, facilitate the settlement and transport of beekeepers and improve the competitiveness of the sector.

Spanish National Strategy for the conservation of pollinators approved by the sectoral conference on the environment on 21 September 2020 (Ministry for Ecological Transition and Demographic Challenge).

Spain is a **member of the International Coalition for Pollinators Conservation**. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), held in December 2016, the thirteenth meeting. At this Conference, Spain decided to join the International Coalition for Pollinators Conservation, aimed at:

- Promoting pollinator-friendly habitats,
- Improving pollinator management and reducing risks
- Avoiding and reducing the use of pesticides harmful to domestic and wild pollinators, and developing alternatives to their use.

Regulatory entities for organic beekeeping: At regional level there are regulatory bodies for organic agricultural production that certify organic honey. They carry out regular checks on registered farms to monitor and evaluate compliance with the standards established for organic production.



POLAND

Training in the application of plant protection products using ground equipment, commonly referred to as chemical training, is intended for people who come into contact with plant protection products. A certificate of completion of such training entitles to perform treatment and to purchase plant protection products. It is also required during inspections in a holding by the State Inspection for Plant Protection and Seed Inspection and the Agency for Restructuring and Modernisation of Agriculture.

Thanks to the development of the Internet, it has become possible to provide information easily and quickly. The website of the Ministry of Agriculture and Rural Development provides (for download) helpful information on integrated pest management, including methodology for integrated pest management, guides to good pest management practice (including pollinator protection), as well as information on decision support systems (e.g. Internet agrophage alarm system, PDO cultivar recommendation).

Moreover, on the website www.minrol.gov.pl an expert opinion is available, commissioned by the Ministry of Agriculture and Rural Development and entitled "Protection of pollinators when using plant protection products", in the form of guidelines for farmers, a guide for advisers and in the form of a video.

The Ministry of Agriculture and Rural Development, together with subordinate and supervised units, undertakes a number of activities aimed at increasing the biodiversity of agrocenosis and promoting beekeeping. The aim of the apiculture programmes is to improve the conditions for the production and marketing of apiculture products in Poland. Financial aid under the programmes is directed to the beekeeping sector, where the final recipients are mainly apiary farms with a veterinary identification number or which are entered in a register kept by a district veterinarian. According to beekeeping organisations, varroasis control and the reimbursement of bee purchases require the strongest support, which is why they are the largest budget items.

In the context of supporting pollinator-friendly activities, it is also worth mentioning the initiative of the producer of the active substance: acetamiprid from the group of neonicotinoids, the Sumi Agro Poland company, entitled "Budujemy populację owadów zapylających". The aim of this action is to educate people connected with agricultural and horticultural production on the importance of pollinating insects and ways to provide them with optimal development conditions. As part of the current campaign, company representatives and experts in this field are sharing their knowledge of pollinating insects and their role in shaping crop yields with producers.



6. The most stringent needs of the group of beekeeper users in relation to the project topic

CYPRUS

Organization: The most necessitate of beekeepers is strong and solid organization in order to support and apply improved methods related to beekeeping.

Education: Farmers need education and support regarding the effects of plant protection products in general, as well as the effects on pollinators. Beekeepers also require special training in organic beekeeping.

Communication and cooperation: Farmers and beekeepers must maintain contact to build communication about common problems and relevant issues. It can be done by creating a website or mobile application in order to give advance notice to the beekeepers.

Authorizations: The controls need to be improved by authorization to prevent a decline in the bee population and achieve the allowable maximum residue level (MRL), which is determined by the European Food Safety Authority.

SLOVAKIA

- Education of the general public and farmers in the application of PPP and fertilizers in connection with the impacts on bees and other pollinators - time, method, concentration, immediate and future consequences for insects.
- Greater cooperation between beekeepers and farmers;
- Better information on application dates for plant protection products- Cooperation between farmers and beekeepers - mutual information on pesticide application – eg. dedicated web portal.
- Plant protection against pests during flowering - total ban, especially in case of oilseed rape.
- A total ban on the use of neonicotinoids
- Solutions to eliminate / replace pesticides in agricultural interventions
- Introduction of alternative / more environmental-friendly methods and practices for plant protection that do not harm bees.



- Organic crop production, but especially crop production that significantly help, crops that are necessary for nutrition and for breeding, or for the existence of bees itself.
- Preservation of species diversity / biodiversity.

ROMANIA

The use of pesticides in the EU tends to be increasingly regulated. They will remain and will be approved products of phytotechnical use, less dangerous for the environment.

The organic market will explode in the near future. Many will probably believe that organic pesticides will only be used on organic farms. Totally wrong! These products will also be used in traditional farms in the near future. Throughout the technological chain, links will be inserted, which until now were present only in organic farms. This process has begun and is unfolding before our eyes.

For example, in the fall of 2019, there were seed companies that treated the seeds with Integral Pro. This biological treatment is based on *Bacillus amyloliquefaciens*. The product does not affect bees or useful entomofauna, it stimulates the immune system of rapeseed plants, also having a fungal role. Moreover, it protects the rapeseed seedlings from flea infestation.

But maybe the biggest problem will be the lack of specialists. As we specified above, in most farms in Romania, the technology is not designed by a specialist. Classic pesticides, but especially BIO ones, have maximum effectiveness when applied at the right time. This optimal time depends on the biology of the parasite to be controlled. Most farmers have no knowledge of entomology or phytopathology. Therefore, the risk of using phytosanitary products at discretion is huge.

SPAIN

- Knowledge about bees in the natural environment and impact of the environmental changes on bees.
- Impact of the pesticides in the environment and bees
- Protection of biodiversity and bees
- Agricultural Good Practices
- Knowledge about fertilisers, pesticides and plant protection products in the area of bee protection
- Medicine and pesticides used to combat bee diseases (e.g. varroasis)



As other issues to be addressed in the area of the impact of agricultural chemicals in a broad sense on bees and other pollinators they only suggested the following topics:

- Alternatives to replace pesticides in agricultural practices or eliminate them
- Importance of awareness and information campaigns for farmers on the importance of bees for agriculture.
- Consequences for bees of the pesticides against voles.
- More environmental-friendly methods and practices for plant protection that do not harm bees.

POLAND

If the bees are well, it means that the environment is clean, but if there is irresponsible use of plant protection products, it affects the bees first and then people.

What does the PZP Board need to do about this?

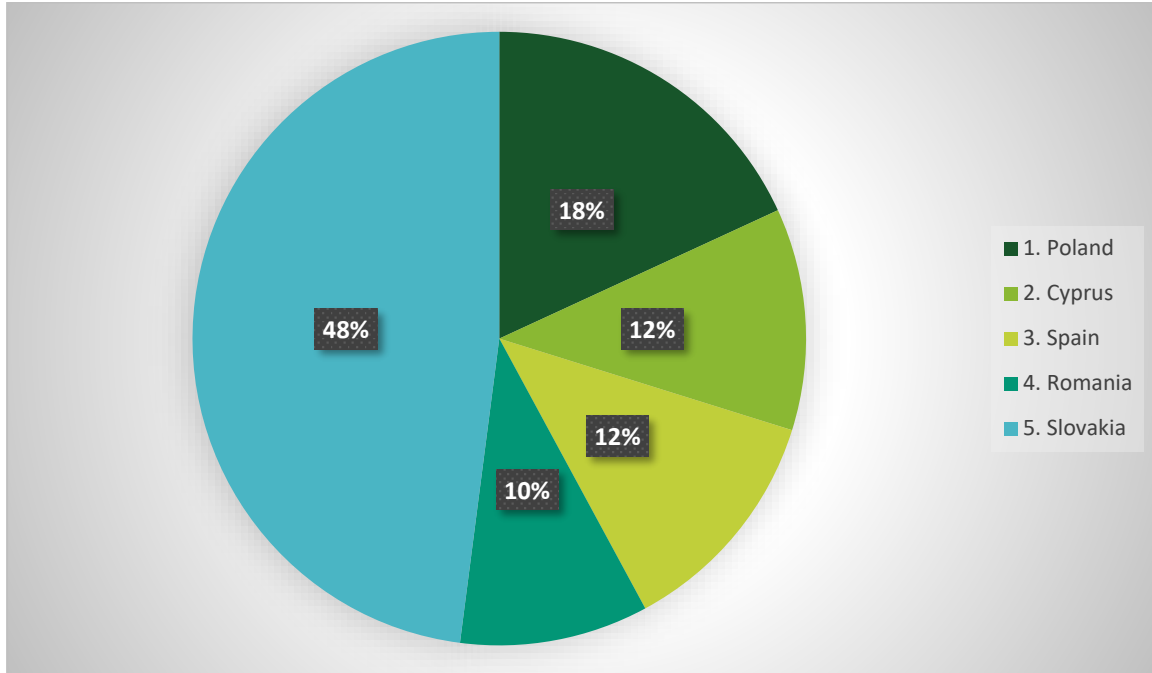
- Bring about legislation such that chemical training for farmers includes more about protecting pollinators and their beneficial role in the environment.
- Simplify the procedure for dealing with damage caused by poisoning from plant protection products.
- Convince agricultural organisations that it is they who must take care to educate farmers, to train their members in the protection of pollinators and their useful role in the environment.
- Establish a compensation fund. Plant protection product distributors must create a compensation fund for beekeepers affected by the improper use of plant protection products. A beekeeper who loses bees in a rape plantation is left without a livelihood for the next year, the farmer pays a small fine, while the distributor of plant protection products is satisfied that it has sold poison and is only counting its profits.
- Legal aid for injured beekeepers.



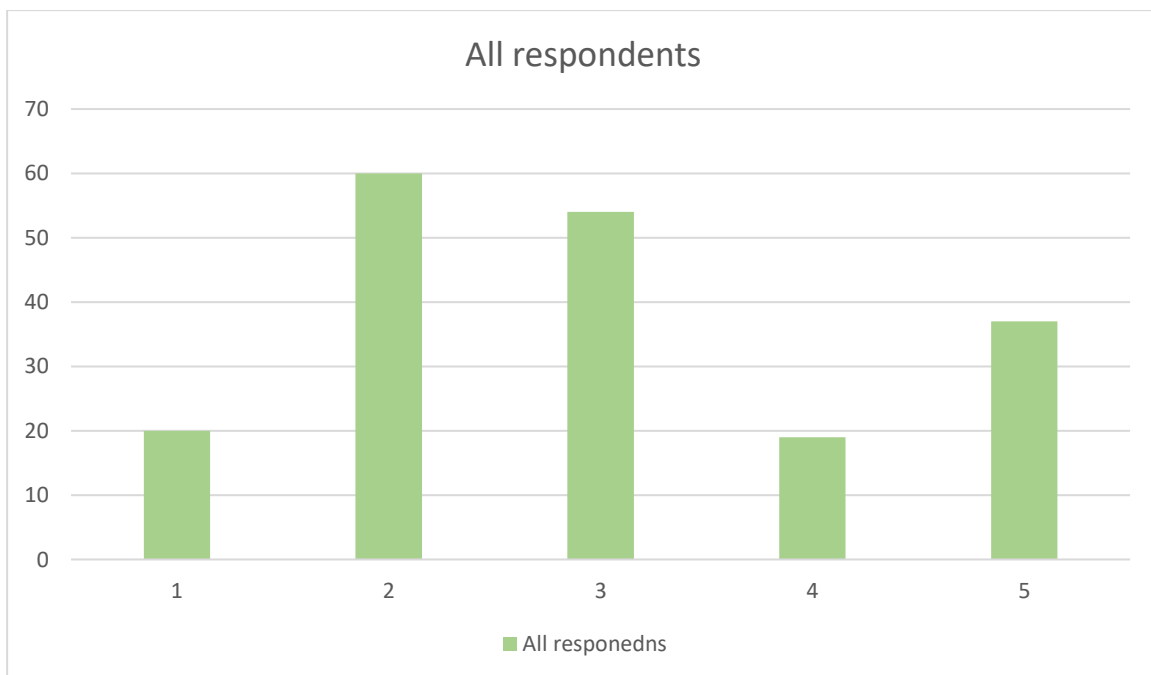
PART 2: ONLINE SURVEY

All respondents: 171

Country of respondents:

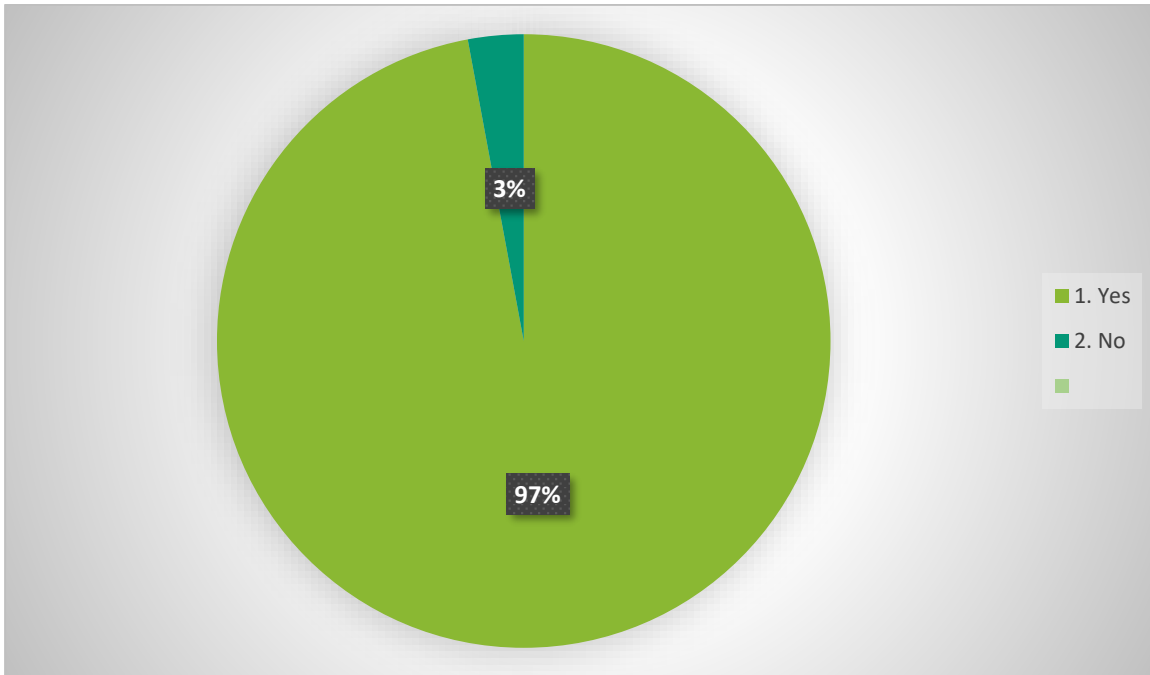


1. Do you consider the knowledge about Bees in Environment and impact of changing environment on bees is sufficiently known among farmers and other stakeholders?

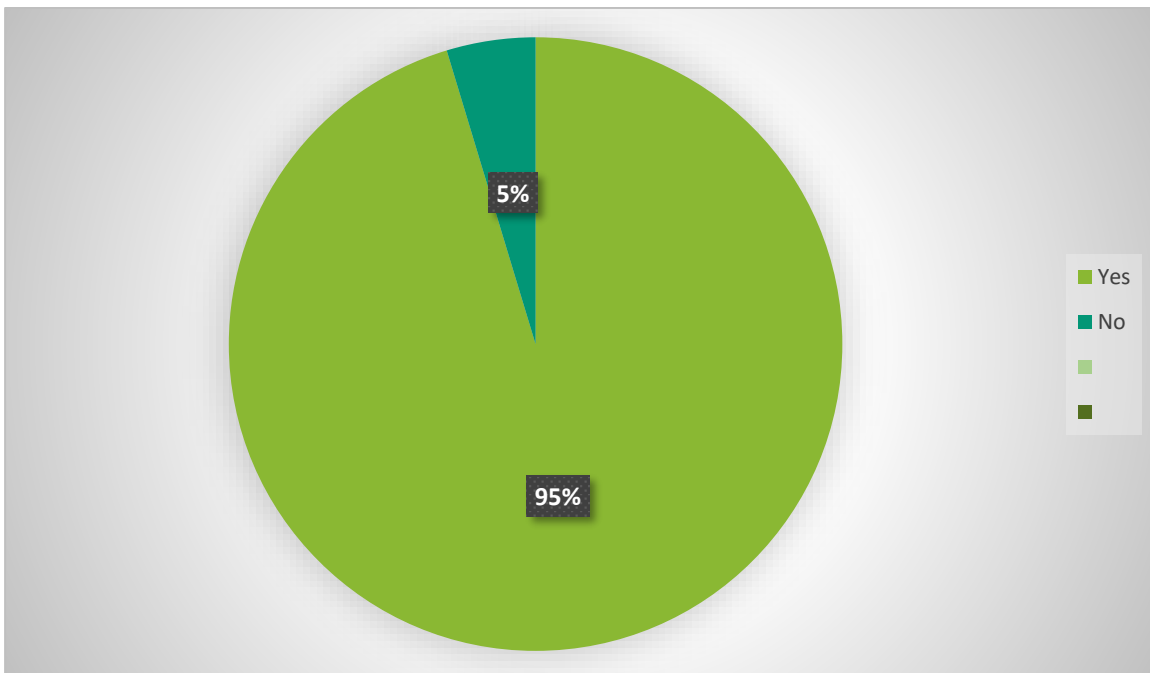




2. Would you be interested to increase your knowledge about honey bees protection?

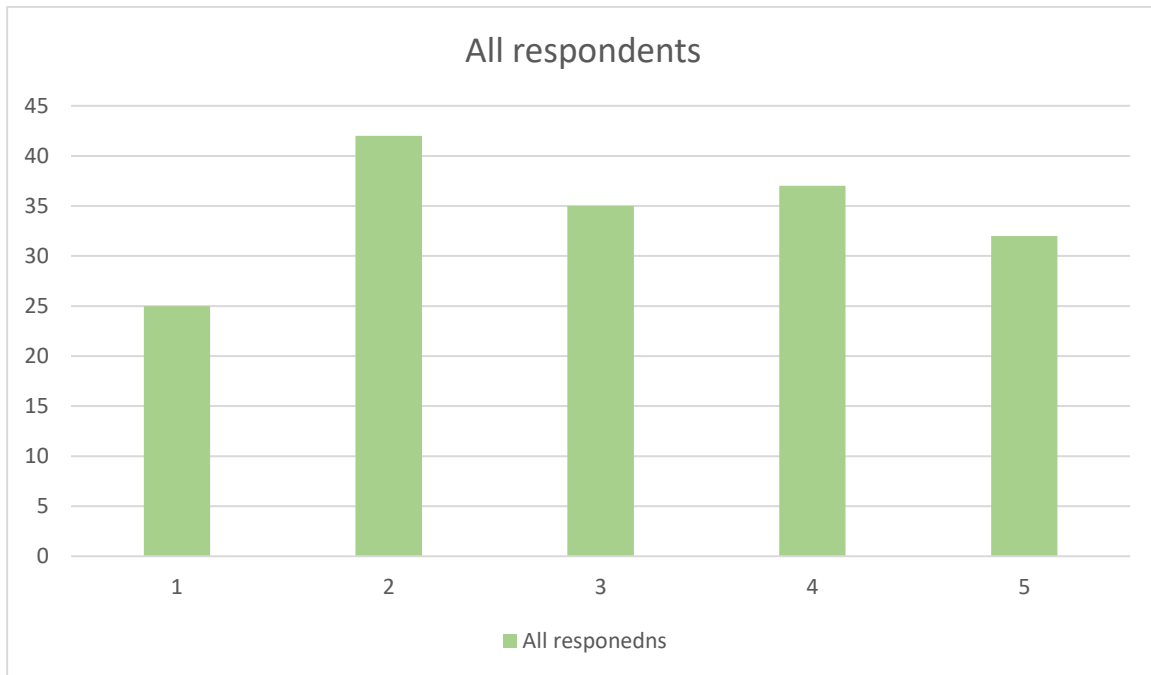


3. Would you be interested to increase your knowledge about wild bees and other pollinators protection?

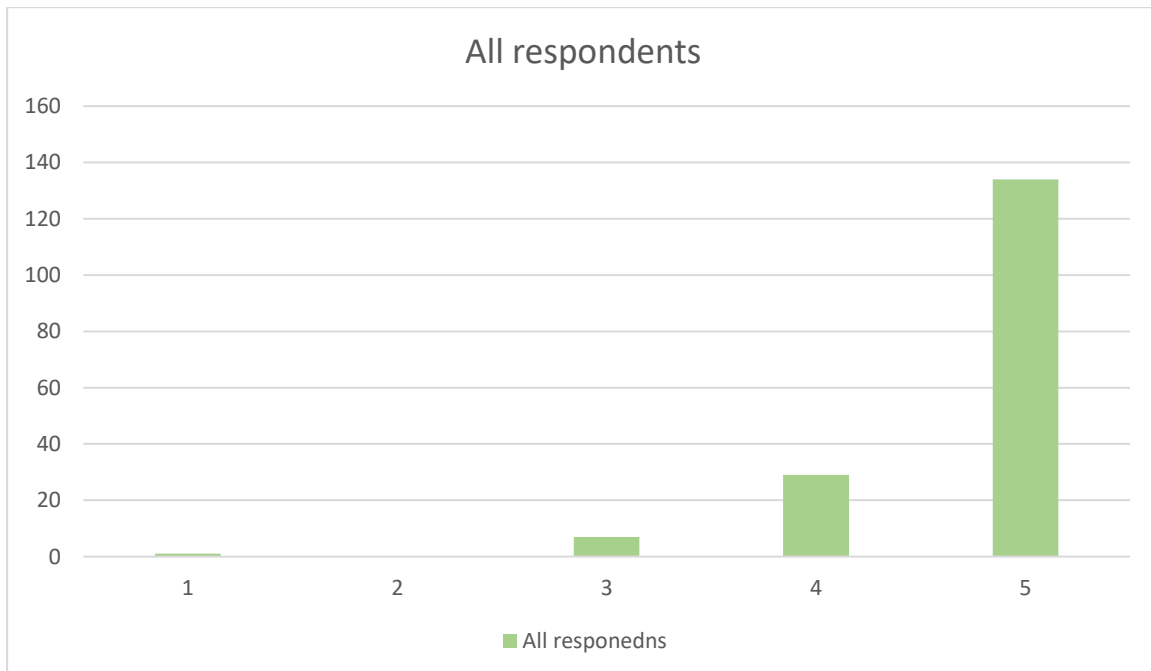




4. Do you know kinds of pesticides used in agriculture in relations to bees?

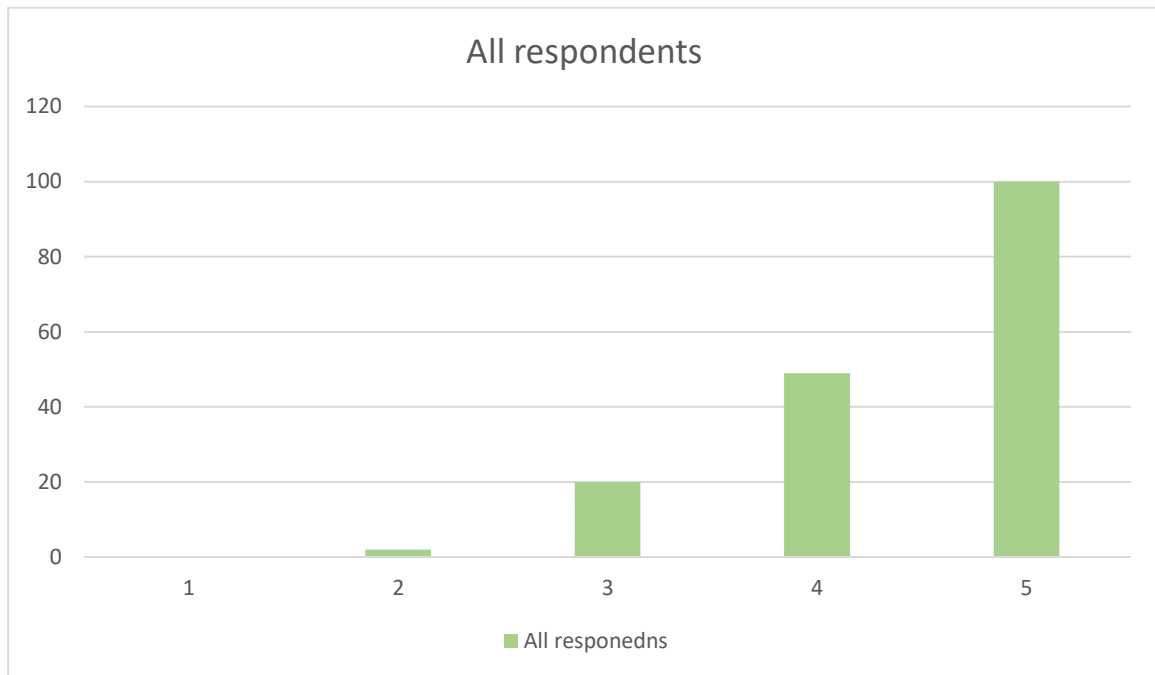


5. Do you consider topic: Impact of pesticides on the environment and bees as necessary?

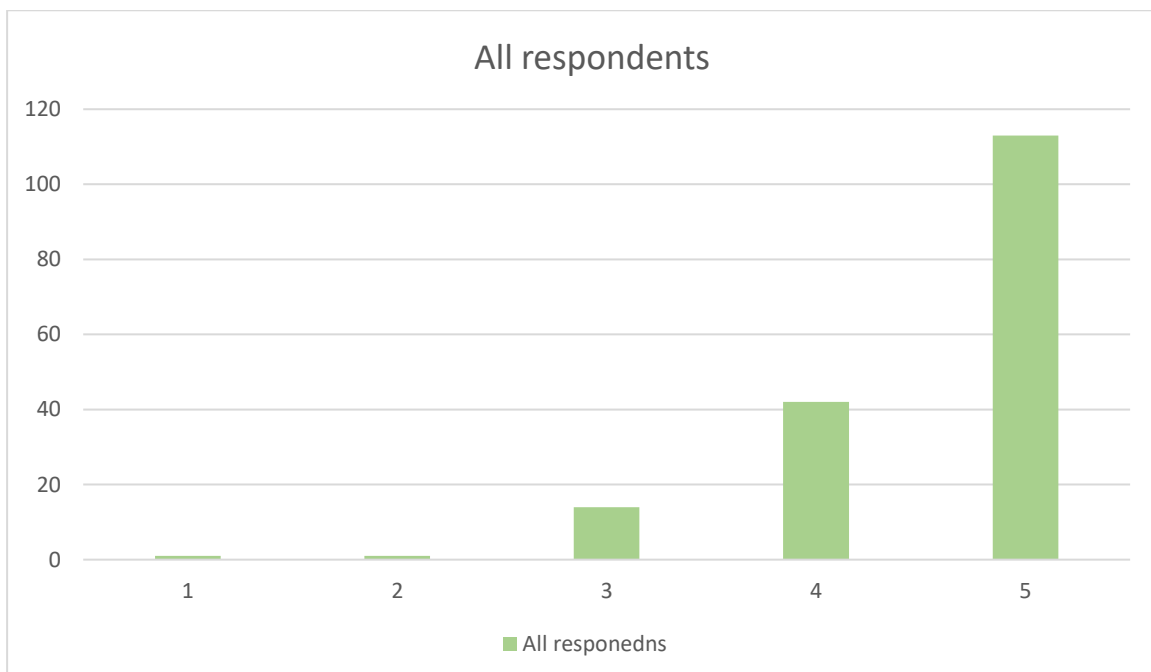




6. Would you be interested to increase your knowledge about alternatives plant protection methods?

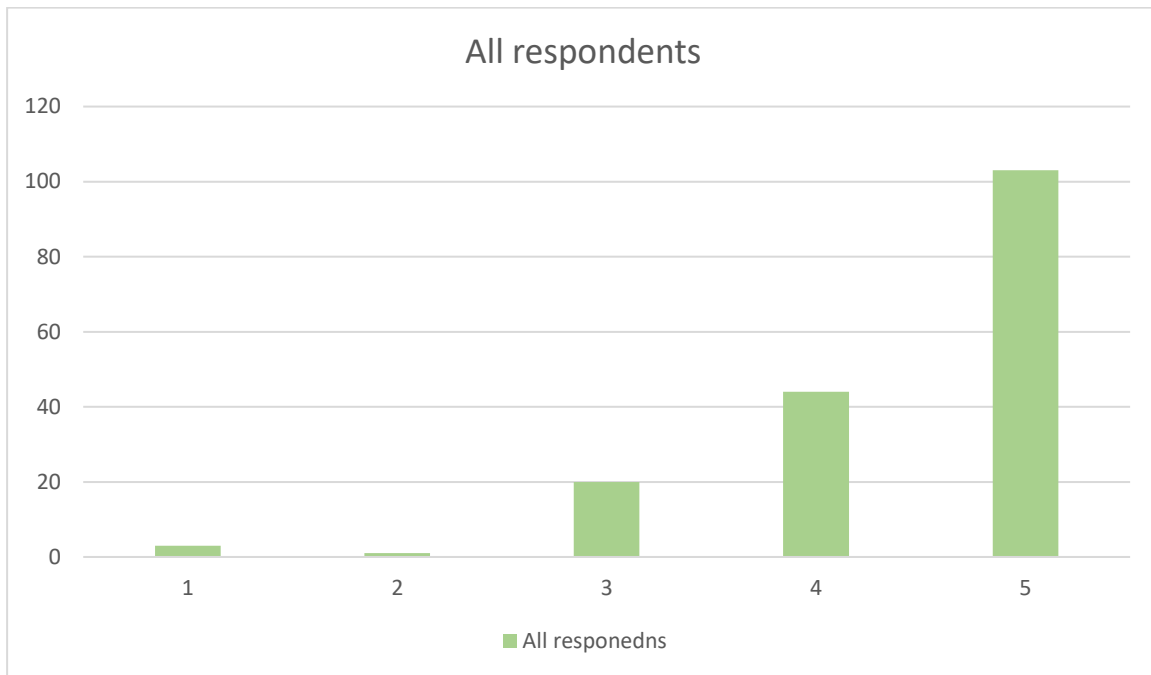


7. Would you be interested to increase your knowledge about biodiversity protection referring to the bees protection?

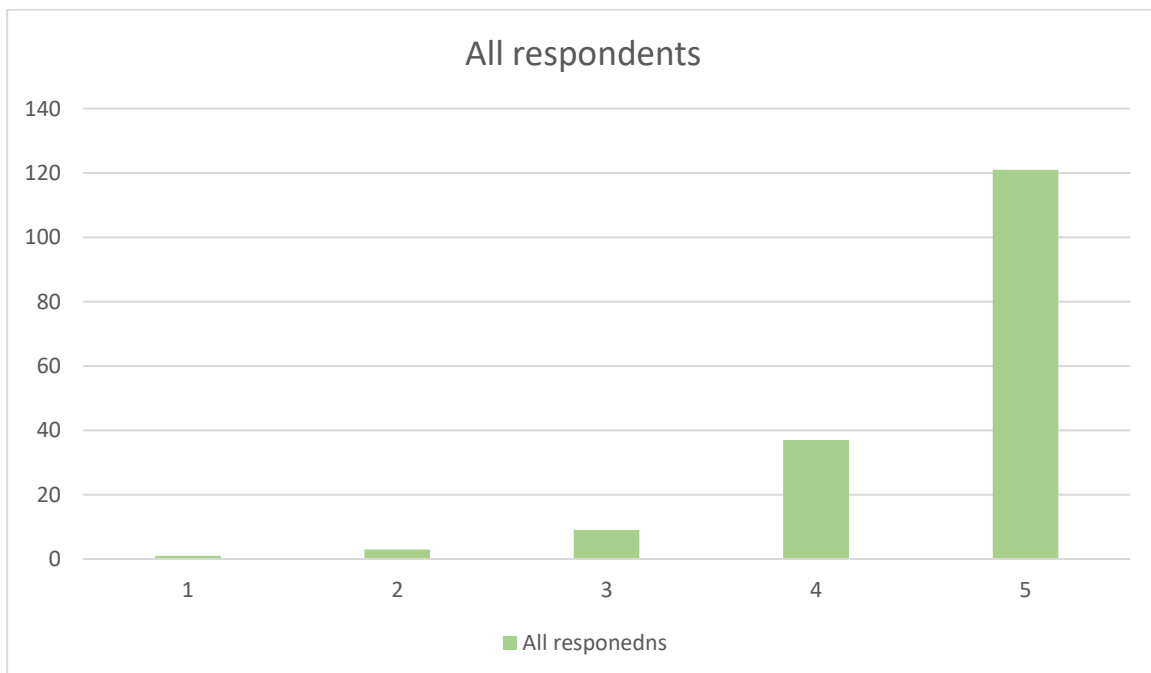




8. Would you be interested to learn more about rules from the Farmer Good Practices referring to the plant protection and fertilisation?

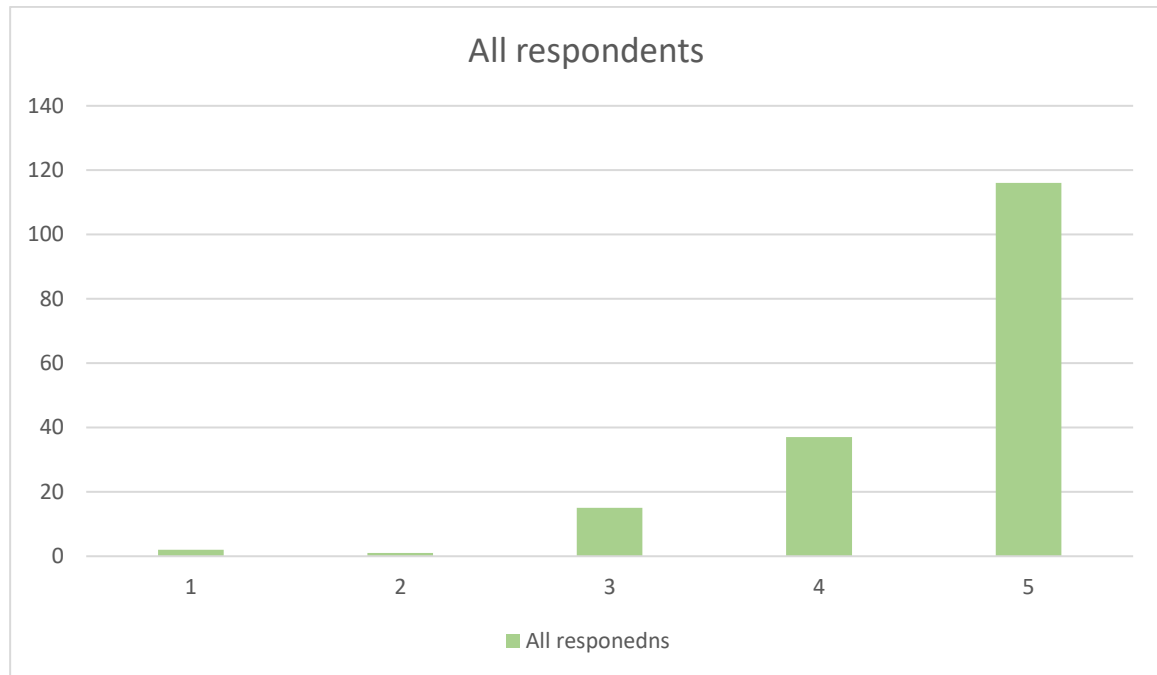


9. Do you think that the knowledge of the plant protections for allotment gardens owners is necessary?

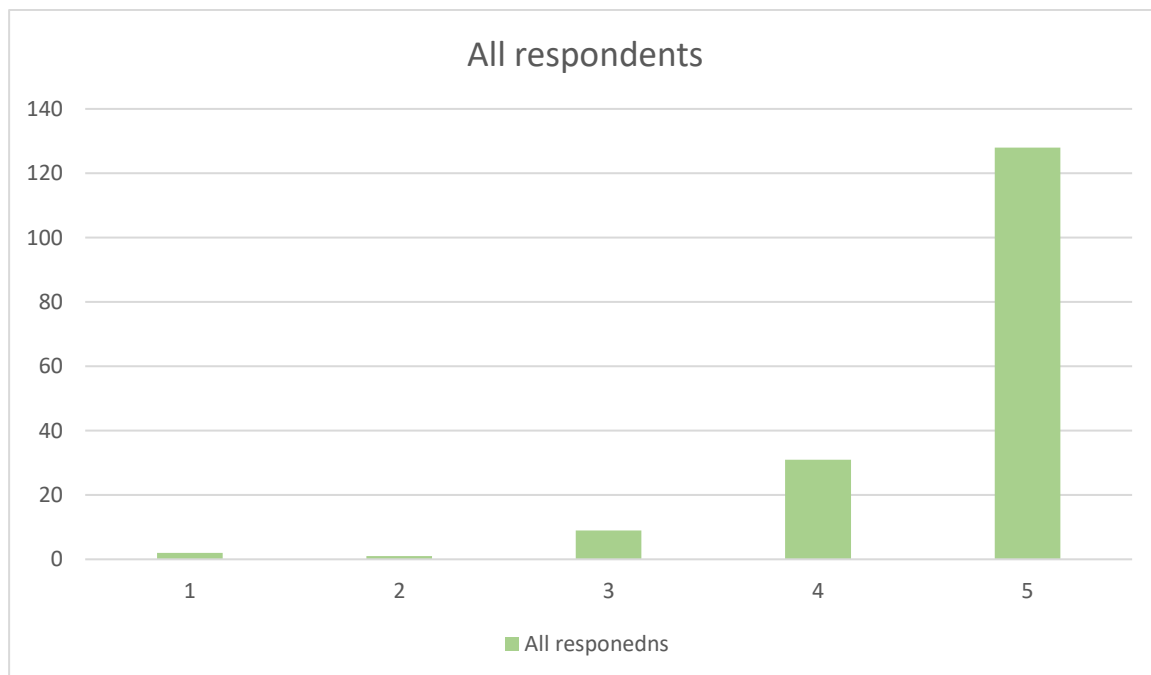




10. Do you consider topic of fertilizers as necessary to learn in the bees protection aspects?



11. Would you like to increase your knowledge about medicine based on pesticides used for bees disease combating (e.g. varroa)?





12. Do you see any other topic necessary for elaboration in the area of impact of the broadly understood chemicals in agriculture on the bees and other pollinators? (All responses)

- As a beekeeper, I find it extremely important to educate the general public and farmers on the application of sprays and fertilizers regarding the impacts on bees and other pollinators - timing, method, concentration, immediate and delayed consequences to insects.
- Eco-farming
- Legislation in other EU countries and Slovakia (pesticides, authorised products)
- Impact on plant protection in the long term
- Being in harmony with nature, not plundering fields at the cost of profit, rotating and omitting sowing practices,
- I don't know. I'm not very familiar with the issues, so as many topics as possible, in as broad a scope as possible.
- Harmfulness of herbicides to the environment in general.
- Pest mapping - availability and simplicity of information
- Comprehensive impact of plant protection products and fertilization on all pollinators
- the molecular basis of action on bee health
- Risks of plant protection products, how to proceed rationally when applying POR, what are the alternatives
- Awareness of commonly used specific products in the agro-industry and their toxicological impact on the environment
- Ensure that the rational use of plant protection products is included in the manuals and practices of everyone who applies them.
- Research on the impact of pesticides on bees in real conditions in arable farming areas, not research on the impact of pesticides on bees in laboratory conditions.
- Use native plants and not GMO, the food will be healthier and the bees will have enough nectar to survive. I only see a problem with GMO plants.
- Organic cultivation of plants, but especially the cultivation of plants that significantly help, are necessary for nutrition and for the breeding or the very existence of bees
- Cooperation between farmers and beekeepers - mutual information on pesticide application - portal. To know where to spray what around me.... Thank you
- The use of biological plant protection with minimal impact on any insects, not just bees. Prohibition of large monocultures and their weed control in order to preserve species diversity.



- Plant pollination, effects of chemicals on plants
- Protection and development of targets, treatment of varroa and the whole plague ...
- Possibilities of using organic fertilization and bee protection in small-scale farming (gardening)
- Correct timing of pesticide application
- I would be interested in solutions on how to remove pesticides in agricultural encroachments
- Online education, protection of animals and plants in an ecological way, legislation in this area
- Plant protection against pests during flowering (complete ban, especially rapeseed oil)
- The topic from question 5
- Online course and downloadable handouts
- Natural plant protection without chemistry...e.g. using other plants and animals. Fertilizing with farmyard manure or compost, leaf litter, etc. Regular strips of honey-bearing plants, shrubs and trees to protect birds and wildlife between the ropes of agricultural production.
- Treating bee colonies in an alternative way
- Perhaps what natural methods and plant protection practices are available that do not harm bees.
- The effect of fertilizers on the health of honey bee colonies
- The impact on the environment as well as the bee keeping
- Honey bee conservation and the impact of environmental change on honey bees
- Organic gardening with impact on the whole community
- Alternative conservation practices and their impact on bee keeping
- Types of bio-preparation for spraying or fertilizing plants
- time - evening of spraying plants
- price of bio spray-fertilizers, subsidies for these products
- In Romania the danger of bees killed with fertilizers is very high. Subjects about how to use chemicals in agriculture safe for bees is very important.
- Replace dangerous chemicals with solutions that do not harm bees
- How to protect bees from chemicals
- I am interested in every topic about bees, protection and farming bees
- It is very important to understand the aspect of chemicals used in agriculture in relationship with bees. Used improperly, chemicals can destroy entire apiaries



- Informing farmers about the timing of insecticide application, knowing that bee poisoning with pesticides is influenced by unfavourable environmental conditions
- Topics about how to safely use chemicals and treatments for bees
- The topics mentioned above seem very relevant and enough in terms of chemicals and pesticides
- Methods for the identification and determination of heavy metal content in honey from agricultural honey crops (rapeseed and sunflower) that have been protected against diseases and pests with pesticides of different chemical groups;
- The most interesting thing would be to make farmers aware that bees are also necessary for them.
- How the problems caused by chemicals could be avoided without stopping the use of chemicals in agriculture.
- Can poisons used to eliminate vole pests affect insect populations?
- The impact of herbicides on arvene flora is brutal
- Implications for food chains and loss of biodiversity
- In the area where I have beehive settlements there are no crops.



Table: Categorized summary of the most frequent answers from point 12

General use of plant protection products (PPP) and their effects on hives	Organic beekeeping / Ecological methods of plant protection	Healing of beehives	Organic practices in agricultural production - in general	Others
Education of the general public and farmers in the application of PPP and fertilizers in connection with the impacts on bees and other pollinators - time, method, concentration, immediate and future consequences for insects.	Alternative nature and bee protection solutions / available natural methods and practices for plant protection that do not harm bees.	Treatment of hives in an alternative way	Alternatives to crop monocultures	Protection of the honey bee
Deaths of bees caused by incorrect application of pesticides	Biological preparations	Protection of bees, treatment of varroa and bee plague...	Pest occurrence mapping - availability and simplicity of information	How to secure bee grazing
Solutions to eliminate / replace pesticides in agricultural interventions	Alternative plant protection practices and their impact on beekeeping		Making the importance of BIODIVERSITY first and foremost	Use native plants and not GMO -food will be healthier and bees will have enough nectar to survive. I see a fundamental problem especially in GMO crops.
Impact of pesticides on bee health / Impact of pesticide use on hives / Complex impact of plant protection products and fertilizers on all pollinators	Organic crop production, but especially crop production that significantly help, crops that are necessary for nutrition and for breeding, or for the existence of bees itself.		Eco-farming	Pollen production capacity of plants, effects of chemicals on the pollen production capacity
Plant protection against pests during flowering (total ban, especially oilseed rape)	PPP for short - term treatment against pests in vegetables of a regular horticultural producer.			Impact of the commercial use of plant protection products on the environment in the long term
Risks of plant protection products, How to proceed rationally in the application of PPP, What are the alternatives	Alternatives to conventional methods of plant protection (regenerative agriculture, permaculture)			Neonicotinoids, precision agriculture



Molecular nature of PPP effects on bee health	Possibilities of using organic fertilization and protection of bees in small-scale production (horticulture)
Legislation in other EU countries and in Slovakia (pesticides, authorized preparations) / list of used pesticides and fertilizers with determination of the size of harmfulness to insects	Organic gardening with an impact on bee colonies
Obligations of the farmer when applying fertilizers to beekeepers	Use of biological plant protection with minimal impact on any insects, not just bees. Prohibition of large monocultures and their control of weeds in order to preserve species diversity.
Impact of herbicides on the environment in general.	Natural plant protection without chemistry ... e.g. with the help of other plants and animals. Fertilization with manure or compost, leaf, etc. Regular belts of honey plants, shrubs and trees for the protection of birds and wild animals among the fields involved in intensive agricultural production.
Cooperation between farmers and beekeepers - mutual information on pesticide application - web portal. So I know where and what they're spraying around me...	Alternative PPP sprays, communication between beekeepers and farmers
	Protection of honey bees and the impact of environmental change on honey bees
	Returning to old, traditional best practices in plant protection



Topics for the development of modules

1. Introduction – **AI (SK)**
2. Bees in the nature – **ARID (PL)**
3. Pesticides 1 – **AI (SK)**
 - M3/1- Insecticides
 - M3/2 – Fungicides
4. Pesticides 2 – **CPIP (RO)**
 - M3/3 – Acaricides
 - M3/4 – Herbicides
5. Pesticides 3 – **Servima (ES)**
 - M3/5 – Rodenticides
 - M3/6 - Other pesticides
6. Fertilizers - **Servima (ES)**
7. Organic practices in agricultural production - in general – **New Edu (SK)**
8. Organic beekeeping / Ecological (bee-friendly) methods of plant protection – **Stando (CY)**
9. Healing of beehives – **CPIP (RO)**
10. The health of bees – **New Edu (SK)**
11. Inventory of good agricultural practices concerning the use of chemicals – **ARID (PL)**
12. Case studies – **Stando (CY)**



CONCLUSIONS

In general, respondents of the Online Survey express interest in the project, its topic and participation in it. The research showed that in each of the countries surveyed, respondents consider this topic to be very important, there are gaps in knowledge and there is a need to fill them.

Beekeeping is the future of our planet. We need to ensure that beekeepers improve their knowledge so that they can do their job as well as possible. Bees are very delicate creatures and it is easy to damage them and destroy whole colonies. It is important to prevent such disasters and to educate people about what is harmful to bees.

The desk research and online survey helped the consortium to understand the level of knowledge and attitudes among people from Spain, Poland, Romania, Slovakia and Cyprus.

It turned out that in every participating country, the availability and quality of pasture for bees has changed dramatically, especially over the last half century, with the advent of intensive agriculture, as hypothesised before the research. Farmers are aware of these changes, especially those who remember earlier times when things were different. Changes could be seen from year to year.

Examples of changes in agriculture include the advent of synthetic fertilizers, indiscriminate use of herbicides, use of nitrogen fertilizers that promote the growth of grasses at the expense of flowering plants, pastures, etc. Therefore, there is a need to continuously educate the public about the harmfulness and effects of the use of the substances mentioned.

Desk Research and Online Survey will contribute to the development of the next stages of the project.

People understand the need to be more conscious and ecological. Consequently, they express interest and willingness to apply ecological practices in their daily habits. Among others, by using more organic plant and bee protection products, taking care of bee health and hive quality, reducing chemicals, eco-farming.

Accordingly, these are the issues that will be considered in the later stages of the project.