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THE IMPACT OF THE BAN ON NEONICOTINOID SEED TREATMENT ON AGRICULTURE IN ROMANIA

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Abstract

In the context of growing concerns about the impact of neonicotinoids on bee populations and biodiversity in general, the European Union has implemented measures to ban these substances. The paper studies the impact of the prohibition of neonicotinoid treatment on the main crops in Romania: sunflower, autumn cereals and corn. The analysis sought to identify the effects of the ban through a rigorous methodological approach, using data from a wide range of sources, including official EU reports, published scientific studies and national agricultural statistical data. Field data obtained through direct observation in various regions of Romania were also included. Through the Regulations it has adopted over time, the European Union has tried to reach an agreement both with beekeepers and especially with European farmers, who, year after year, face the attacks of soil pests for the main crops namely: sunflower, corn and cereals. The main results and conclusions of our study demonstrate the effectiveness of the neonicotinoid ban in protecting bee populations and biodiversity but also highlight the complexity of the transition to alternative agricultural practices. Our results suggest the need for integrated policy and support strategies to ensure a sustainable transition without compromising agricultural productivity.

Key words: *neonicotinoids, agriculture, seed treatment, bees, European Union*

INTRODUCTION

The European Union (EU) has taken a decisive action on the use of neonicotinoids, given their negative impact on the environment and, in particular, on the populations of bees and other pollinators [3, 7].

In 2009, the European Commission adopted the Regulation (EC) no. 1107/2009 regarding the introduction of phytosanitary products on the market, a regulation including new rules for the use of phytosanitary products but, at the same time, the risks that may exist if the recommendations proposed in this document are not followed. It is very clearly specified in the document that vegetable production occupies a very important place within the Community [19].

In 2013, the European Commission adopted Regulation (EC) no. 485/2013, which imposed a ban on the use of three substances from the category of neonicotinoids, namely imidacloprid, thiamethoxam and clothianidin, in the treatment of sunflower, corn and rape seeds [16, 2]. The decision was made based on scientific assessments that highlighted serious risks to pollinators [8]. To begin with, the restriction was valid for 2 years, to evaluate the impact of the substances on bee populations.

The European Commission's decision to ban the three substances from the neonicotinoid class was adopted following investigations carried out in 2012 by the European Food Safety Authority (EFSA). These investigations have shown that the insecticides imidacloprid, thiamethoxam and clothianidin, used by farmers to treat seeds, harm pollinating insects. However, the use of these substances remains permitted in protected areas [13].

EFSA played a crucial role in assessing the risks associated with the use of neonicotinoids. EFSA published several scientific reports that served as the basis for EU regulatory decisions.

In 2018, by Regulation (EU) 2018/784 implementing the amendments to Regulation (EU) no. 540/2011 regarding the approvalconditions of the active substance clothianidin, the European Commission prohibits the sale of insecticides containing

clothianidin, but also of seeds treated with it, except crops grown in protected areas [11, 20]. Despite all these regulations that the European Commission drew up due to the pressures of farmers and certain Member States, exemptions were issued regarding treating sunflower and corn seeds with neonicotinoids, more precisely with imidacloprid. The latter is the most used substance in the neonicotinoid category for seed treatment.

EU decisions were preceded by public consultations and discussions with member states, thus ensuring a transparent and participatory process. Farmers, beekeepers, non-governmental organisations and other stakeholders could express their views and concerns.

The bans imposed had a considerable impact on farmers who relied on neonicotinoids to protect their crops from pests. Despite this, the European Union has actively promoted the transition to safer solutions and sustainable agricultural practices. Among these measures are the adoption of environmentally friendly alternatives such as biopesticides and the implementation of crop rotation techniques to reduce reliance on harmful chemicals and help maintain ecological balance.

Under the influence of the pressure exerted by beekeepers and in the context of the numerous exceptions granted to neonicotinoids, the European Court of Justice decided that Article 53, paragraph (1) of Regulation 1107/2009 no longer gives Member States the authority to allow the placing on the market of phytosanitary products intended for the treatment seeds or the marketing and use of seeds treated with certain products, in situations where these products have been prohibited by an implementing regulation. The decision emphasizes the strictness of European regulations regarding the protection of the environment and public health, thus strengthening existing prohibitions and limiting the flexibility of member states in derogating from them [14].

In this context, the research aimed to analyze the effects that the ban on the use of neonicotinoids had on the main crops in Romania. The study was particularly focused on corn, sunflower and rapeseed crops, which represent some of the most important crops from an economic point of view for Romanian agriculture. Through this approach, it was aimed not only to quantify the economic impact but also to identify changes in agricultural practices and how farmers had to adapt to the new regulations imposed at the European level. The evaluation also looked at aspects related to plant health and possible alternatives used to protect these crops, trying to provide a complete picture of the consequences of the ban on neonicotinoids in Romanian agriculture.

MATERIALS AND METHODS

In this sense, the main crops in Romania were presented, where neonicotinoids from seed treatment are of great interest to farmers, but also the negative effects their use could have on the environment. The data on the areas and crop production were obtained from the National Institute of Statistics of Romania.

The paper also presents the main pests fought with neonicotinoids, their influence on bee flocks, and the European Union Regulations that were the basis for banning these substances in EU member countries.

RESULTS AND DISCUSSIONS

Neonicotinoids are a class of insecticides with neuro-active action, having a chemical structure similar to that of nicotine. These substances act specifically on the central nervous system of insects, disrupting its normal functioning. Because of their mode of action, neonicotinoids are highly effective in controlling agricultural pests, but this high effectiveness has also raised concerns about their impact on other species, including pollinating insects essential to natural ecosystems and crops [2, 6, 21].

They are a class of insecticides widely used in agriculture to protect crops from major soil pests. These insecticides were developed by Shell and Bayer in the 1980s [15].

The prohibition of neonicotinoid seed treatment has a significant impact on the main crops in Romania.

The main crops for which Romanian farmers do not want to give up the use of neonicotinoid treatments are sunflower, corn (wheat and barley) and rape. These crops in our country represent a significant share of the cultivated area of each farm (Table 1).

Table 1. Cultivated area and production of the main crops

	Cultivated area Ha (K)		Total production Tons (K)		2023 compared to 2022	
	2022	2023	2022	2023	Ha	Tons
Cereals for grains	5,184	5,238	18,861	20,571	54	1,710
-wheat	2,169	2,208	8,684	9,635	39	951
-barley	426	501	1,707	2,001	75	294
-corn	2,431	2,373	8,037	8,522	-58	485
Oil plants	1,701	1,859	3,584	4,122	158	538
-sunflower	1,093	1,089	2,107	2,028	-4	-79
-rape	469	625	1,230	1,787	156	557

Source: National Institute of Statistics [12].

The prohibition of the treatment of seeds with neonicotinoids has a significant impact on agriculture in Romania [5]. Neonicotinoids, a class of insecticides, have been widely used to protect crops against pests. However, these substances have been associated with negative effects on the environment, particularly on populations of bees and other pollinating insects.

The prohibition of treatment with neonicotinoids presents a series of negative effects, experienced over time by farmers, among which we mention:

-significant decreases in yield for corn and sunflower crops. These crops are particularly vulnerable to attacks by insect pests such as *Tanymecus dilaticollis* (maize beetle). Without the protection afforded by neonicotinoids, crop losses can be substantial, affecting production and farm incomes;

-neonicotinoids are known for their effectiveness in combating a wide spectrum of insect pests, but without them, crops can become more vulnerable to attack, which can lead to more pressure on everyone involved (producers, distributors and farmers) in agriculture to find alternative solutions.

In parallel, certain associated advantages include aspects related to the conservation of biodiversity, by protecting ecosystems, which are essential for maintaining a healthy natural balance. At the same time, special emphasis is placed on improving soil and water quality, recognizing the crucial role these resources play in the long-term sustainability of agriculture. By using sustainable agricultural practices, the aim is not only to increase efficiency in production but also to reduce the negative impact on the environment, thus ensuring a harmonization between economic activities and environmental protection. These measures reflect a deep commitment to developing agricultural systems that are resilient, regenerative and capable of sustaining human communities responsibly and equitably.

-one of the main reasons for banning neonicotinoids is to protect bees and other pollinators, which are essential for the health of ecosystems and the pollination of many crops. Reducing the use of these pesticides can help halt the decline in populations of bees and other beneficial species [9, 10].

-furthermore, neonicotinoids are said to contaminate soil and water, adversely affecting aquatic organisms and soil health. Banning them can lead to a reduction of these contaminants and improve the quality of the environment.

-banning neonicotinoids may encourage farmers to adopt more sustainable agricultural practices such as crop rotation, use of natural pest predators, organic products and other environmentally friendly methods of managing pest attacks.

The multiple exemptions obtained by the Ministry of Agriculture and Rural Development, which allowed Romanian farmers to use imidacloprid as an insecticide for the treatment of the main field crops, were

justified by the presence of specific soil pests, which certain regions of the country face. These exceptions were invoked against the background of an urgent need to protect crops against infestations that could have seriously compromised agricultural production in the affected areas. The decision to request these exemptions reflects the complexity of phytosanitary challenges in Romanian agriculture and the need for quick and efficient solutions to maintain stability and productivity in the agricultural sector. These are: *Zabrus tenebrioides*, *Agriotes spp* and *Tanymecus dilacotillis*.

We find *Zabrus tenebrioides* (the ghebos beetle) spread all over Europe and in Romania we find it in all the areas where wheat and barley are mainly cultivated, but more frequently in the Bărăganului Plain but also Dobrogea [Photo 1]. It is a dangerous pest because it can cause losses of 80% or even 95% in years of invasion [1]. The ghebos beetle overwinters as a larva and when the soil temperatures exceed 3 degrees Celsius, it comes out of the ground and eats the leaves of the plants, until they are destroyed [17].

Photo 1. Larva of *Zabrus tenebrioides*
Source: Original own photo.

Agriotes spp. (wireworms) are widespread in all the territories of our country, but we find them mainly in SE Romania (Photo 2). They have multiplied mainly due to the farmers' practice of monoculture but also due to the non-observance of rotations. Unlike other soil pests that have one generation per year or even more, wireworms have a generation of 3 – 4 years.

If we have a drought, the larvae migrate into the soil, at depth, looking for moisture. But if there is precipitation outside, the larvae move to the surface of the soil where the agricultural plants are found and attack them. Agriotes spp. is a common pest for sunflowers, and autumn cereals, but especially maize [18].

Photo 2.*Agriotes spp.*
Source: Original own photo.

Tanymecus dilacotillis, the corn borer, appears in late April and early May [Photo 3]. We find it in most areas of Romania, being reported for the first time in 1904 [4].We find it especially where corn and sunflower culture predominate.

Photo 3. Adult *Tanymecus dilacotillis*
Source: Original own photo.

When the plants have 2-4 leaves then they attack the hardest, cutting the plants from the parcel and a mass attack can compromise the entire crop. If the plants are attacked when they

are in a more advanced phase of vegetation, the plants recover but we see a delay in growth.

CONCLUSIONS

Banning neonicotinoids in Romania has both advantages and challenges. Although the measure protects the environment and the health of pollinators, it forces farmers to find alternative solutions, which may be more expensive and difficult to implement in the short term. Investments in agricultural research and education are essential to help the agricultural sector transition to more sustainable and efficient practices.

In recent years, the use of neonicotinoids in Romanian agriculture has been an intensely disputed topic between farmers and beekeepers. Each of them came up with convincing arguments to support their cause and the businesses they own. Numerous articles have been written in the press and numerous studies and documentation have been done regarding the impact of neonicotinoids on bee colonies.

The point of view of beekeepers is to ban neonicotinoids for treating sunflower and corn seeds because, they say, these substances affect the ability of bees to search for food, can cause increased mortality among bee populations, reduced colony development, increased risk of disease but also the decrease in honey production.

On the opposite side, come the farmers who claim that, together with the manufacturers who sell neonicotinoids, if the substances are used as the manufacturer writes in the technical sheet and the seeds are treated in appropriate spaces and by those approved, controlled by the Phytosanitary Directorates, the risks for the livestock of bees decreases.

Regarding the future of pesticide regulation, the EU continues to monitor the use of pesticides and their impact on the environment and human health.

The regulations are periodically reviewed based on new scientific evidence and technologies, to ensure sustainable agriculture and protecting biodiversity.

In conclusion, the EU has taken a cautious and proactive stance on the use of neonicotinoids, based on sound scientific evidence and the need to protect the environment and pollinators vital to agriculture. The banning decisions reflect the EU's commitment to sustainable agriculture and biodiversity conservation.

In Romania, the last exemption in this case is from November 16, 2023 and came into force from January 22 - May 21, 2024. All products or seeds treated with imidacloprid that were not used by May 21, 2024, had to be destroyed.

At this moment, due to climate change and especially the spread of soil pests that cause significant damage to sunflower and corn crops in our country, the Ministry of Agriculture and Rural Development is trying, together with relevant organizations, to find a long-term solution for using of neonicotinoids in our country to be able to treat sunflower and corn seeds and Romanian farmers to obtain satisfactory productions.

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