

## Monitoring of neonicotinoid residues (imidacloprid, clothianidin, thiamethoxam) in maize, sunflower and rapeseed crops in Romanian conditions

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Romania recorded in the years 2017-2019 record productions for maize and sunflower, being, in 2019, on the first place in Europe and being, according to Eurostat data, the eighth agricultural power in Europe. As a result of the measures imposed by the European Commission, Romania will face the impossibility of maintaining the cultivated areas with these crops. Due to the restrictions imposed on Romanian farmers, they are facing an alarming increase in the population density of some soil pests, the most dangerous being *Tanymecus dilaticollis* and *Agriotes spp*, no insecticides being available for maize seed treatment against *T. dilaticollis* in Romania.

In this context, since 2018, the Ministry of Agriculture and Rural Development together with the Academy of Agricultural and Forestry Sciences funds research to monitor populations of *Tanymecus dilaticollis* and *Agriotes sp*, but also the level of residues of neonicotinoids in soil, plants in various stages of development (leaves and inflorescences), as well as bees and hive products (pollen, honey)

Studies are performed in three areas of Romania, respectively, Moldova (Neamt county) and south of country (Calarasi county) where *Tanymecus dilaticollis* exceed the economic damage threshold (4-5 adults/sqm) and Dealurile Subcarpatice (Arges county), where *Agriotes spp* populations exceed the economic damage threshold (2-4 larvae/sqm), areas where maize and sunflower are the main crops

Regarding the evolution of the population of maize leaf weevil in the period 2018-2020, from the data obtained it can be observed that the number of adults/sqm has remained above the economic damage threshold, respectively, Neamt County 8 adults/sqm at sunflower and maize; Calarasi County between 7 and 12 adults/sqm and in Arges County, where *Agriotes spp* is the most dangerous pest, population density varied between 10,08 larvae/sqm in 2018 and 22,16 larvae/sqm in 2020, economic damage threshold depends on climatic conditions in spring being 2-4 larvae/sqm.

Regarding monitoring of neonicotinoids residues, residues level of imidacloprid, clothianidin and thiametoxam, were determined in accredited laboratories from Germany, France and Bulgaria using certificated methods.

The table below presents the mentioned results obtained during three years of studies, as well as their statistical analysis, the research continuing within the project funded by MADR, until 2022.

Type of sample		2018		2019		2020	
		Nr.total probe	% probe > LOQ	Nr.total probe	% probe > LOQ	Nr.total probe	% probe > LOQ
<b>SOIL</b>		-	-	27	<b>44,44</b> (12 probe)	53	<b>9,43</b> (5 probe)
<b>PLANT</b> (including flowers)		53	<b>20,75</b> (11 probe)	74	<b>16,21</b> (12 probe din care 4 probe tiacloprid)	85	<b>7,05</b> (6 probe, dc 1 acetamiprid)
Only <b>FLOWERS</b>		36	<b>16,66</b> (6 probe)	35	<b>5,71</b> (2 probe tiacloprid)	40	0
<b>HIVE PRODUCTS</b>	Bees	10	<b>20</b> (2 probe)	5	0	6	0
	Polen	26	<b>26,92</b> (7 probe)	4 (polen+ fagure)	0	6	0
	Honeycomb with brood	-	-	-	-	6	<b>16,6</b> 1 acetamiprid
	Honey	16	0	12	0	6	<b>16,6</b> 1 acetamiprid
<b>TOTAL</b>		<b>105</b>	<b>19,04</b> (20 probe)	<b>126</b>	<b>19,04</b> (24 probe)	<b>162</b>	<b>8,02</b> (13 probe)

LOQ = 0,01 mg ai/kg sample

MRL honey

Imidacloprid = 0,05 mg/kg  
Clotianidin = 0,05 mg/kg  
Tiametoxam = 0,05 mg/kg

MRL boabe porumb

Imidacloprid = 0,1 mg/kg  
Clotianidin = 0,02 mg/kg  
Tiametoxam = 0,05 mg/kg

The statistical analysis shows very low variability between annual samples, most samples being, in terms of residues, below the limit of quantification. Of the total samples, most with residue content above LOQ, are soil samples, an absolutely normal situation, as the neonicotinoid treatment was applied to the seed. It is also very important that the lowest percentage of samples with residues above the limit of quantification, was recorded in samples of honey, inflorescences and bees, the annual deviations being insignificant.

During the three years, samples were also collected from rapeseed crops. Since 2019, rapeseed has been treated with cyantraniliprol. In sunflower, it has been banned since 2020 to treat the seed with neonicotinoids.

MARD authorized for the period January 20, 2020 - May 1, 2020, according to art. 53 of Regulation (EC) no. 1107/2009, the use in emergency situations of three plant protection products based on neonicotinoids in the treatment of maize seeds, The European Commission adopted on February 3/2020 decisions banning Lithuania and Romania from granting unjustified emergency permits for pesticides containing the three types of neonicotinoids after the use of these substances was found to affect bees and their use was limited in the European Union.

Romanian researchers are concerned about finding alternative methods to control *T. dilaticollis*, but due to the high density of the pest mentioned in certain areas of the country, treating seeds with neonicotinoid insecticides remains the only solution for Romanian farmers, corn growers.