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RESEARCH ON THE ATTACK CAUSED BY SPECIES OF THE GENUS *EURYGASTER* IN SOME WHEAT CROPS IN IASI COUNTY

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ABSTRACT

Observations and analyses on the attack produced by species of the genus Eurygaster on wheat crops. from 10 nearby localities in Iasi County. To apply the research methodology, laboratory analyses were carried out on wheat samples (15 in number) that were randomly taken from different points of the lots at various depths. From the samples selected from all 10 locations in 2020, a very high incidence of the degree of attack could be observed, practically all the grains showed traces of the insect attack, with the exception of the samples from the localities of Mosna, Tutora, Gorban and Cozmesti where variable quantities of unaffected grains were recorded. In 2021, there was a significant increase in the quantity of grains analyzed compared to the previous year. In the samples analyzed in 2022, the frequency of affected grains showed a decrease as well as a different distribution of the pest attack. This trend of decreasing attack frequency suggests a possible efficiency of the applied control measures or less favorable climatic conditions for the development of the pest.

INTRODUCTION

Stink bug infestations in wheat represent one of the most severe phytosanitary challenges in cereal agriculture. These insects feed by piercing grains and young plant tissues, directly impairing plant development and reducing crop quality. (Borcean 2002). Heavy infestations can lead to substantial yield losses, and affected wheat often loses its baking quality, resulting in significant economic consequences for farmers.

The wheat-damaging species *Eurygaster integriceps* emerge in spring as temperatures rise. They migrate from overwintering sites to cultivated fields and attack plants during critical developmental stages, from stem elongation to grain filling. (Critchley 1998, Davari 2008). Their feeding causes shriveled grains, and the enzymes they inject degrade gluten, compromising flour quality.

Effective management relies on vigilant monitoring, precise application of phytosanitary treatments, and adherence to crop rotation practices. (Tălmaciu 2019; Mocanu 2018) In the context of climate change, which may enhance the survival and proliferation of these pests, integrated pest management strategies are becoming increasingly crucial for safeguarding wheat production.

MATERIAL AND METHODS

To determine the impact of stink bug attacks on both quantitative and qualitative wheat production, laboratory analyses were conducted on wheat grain samples collected from ten localities in Iași County: Prisăcani, Răducăneni, Dolhești, Moșna, Grozești, Țuțora, Gorban, Comarna, Costuleni, and Cozmești.

The grains were sampled randomly from different points within the wheat fields at varying depths. (Marinciu 2022). The samples were homogeneous and representative, with the number of sampling points determined according to the size of each plot; in this study, approximately 15 points per plot were sampled. From the collected samples, a composite sample of 10 kg was prepared and analyzed using three distinct methods: the Paikin Method, the Kretovici Method, and the Christensen & Qasem Method.

The Paikin Method allows visual identification of damaged grains through backlighting, facilitating the observation of structural changes caused by pest feeding.

The Kretovici Method is based on the reaction between ninhydrin and amino acids released from endosperm proteins; damaged areas of the grains develop a dark violet coloration, enabling quantification of infestation levels.

The Christensen & Qasem Method highlights damaged zones by providing a clear contrast between healthy and affected grains through the use of sodium hypochlorite, which decolorizes intact proteins in the wheat grain.

RESULTS AND DISCUSSIONS

Analyses of wheat grains damaged by *Eurygaster integriceps* from various localities in the Comarna research area during 2020 showed that, in most of the localities studied, all harvested grains were affected by the insect attack. Exceptions were observed in Moșna, Țuțora, Gorban, and Cozmești, where variable amounts of unaffected grains were recorded.

The largest total analyzed quantity came from Comarna (1,276 kg), where a high incidence of infestation was also observed. Of this, 1,020 kg of grains were affected with an infestation level of 0,1–1 %, 176 kg fell into the 1,1–2 % category, and 80 kg into the 2,1–3 % category (Table 1).

Table 1

The results of the analyzes regarding the frequency (%) of the grains pricked by Eurygaster spp. in 2020

No.	Location	Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)	Frequency of infestation (F %)			
					0,1-1 %	1,1-2 %	2,1-3 %	3,1-4 %
1.	PRISĂCANI	84	0	84	20	20	24	20
2.	VF. CÂMPULUI	125	0	125	0	80	45	0
3.	DOLHEȘTI	130	0	130	0	90	40	0
4.	MOȘNA	135	32	103	0	72	31	0
5.	GROZEȘTI	28	0	28	5	15	8	0
6.	ȚUȚORA	40	10	30	2	13	15	0
7.	GORBAN	142	40	102	12	30	20	40
8.	COMARNA	1276	0	1276	0	1020	176	80
9.	COSTULENI	215	0	215	60	80	45	30
10.	COZMEȘTI	325	34	291	120	140	31	0

The localities of Răducăneni and Dolhești recorded a generalized attack, with no amount of unaffected berries. Cozmești also stands out for a large number of attacked berries (291 kg), with a significant distribution in the infestation categories of 0,1-1 % and 1,1-2 %.

Regarding the distribution of the attack, the most affected category was the 1,1-2 % (1560 kg), followed by the 2,1-3 % category (435 kg). Severe infestation (3,1-4 %) was lower, totaling 170 kg, but was significantly observed in the localities of Gorban, Comarna and Costuleni.

In 2021, the analysis of the frequency of berries infested by *Eurygaster spp*. in the Comarna area highlights a significant increase in the total amount of berries analyzed compared to the previous year, but also an expansion of the pest attack. Of the 3007 kg of berries evaluated, only 330 kg were unaffected, indicating a high degree of infestation, especially in the localities of Prisăcani and Dolhești, where over 80 % of the production was classified in the 2,1-3 % attack category (Tab. 2).

Table 2

The results of the analyzes regarding the frequency (%) of the grains pricked by *Eurygaster* spp. in 2021

No.	Location	Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)	Frequency of infestation (F %)			
					0,1-1 %	1,1-2 %	2,1-3 %	3,1-4 %
1.	PRISĂCANI	1267	0	1267	0	118	1049	100
2.	VF. CÂMPULUI	145	0	145	0	105	40	0
3.	DOLHEȘTI	864	0	864	0	122	742	0
4.	MOȘNA	120	0	120	0	90	30	0
5.	GROZEȘTI	150	70	80	0	70	10	0
6.	ȚUȚORA	8	5	3	1	2	0	0
7.	GORBAN	40	35	5	1	3	1	0
8.	COMARNA	5	0	5	0	5	0	0
9.	COSTULENI	320	260	60	20	30	10	0
10.	COZMEȘTI	88	0	88	48	40	0	0

Although in some areas, such as Țuțora, Gorban and Comarna, the infestation was minimal, in other localities a significant distribution of the attack was observed in the 1,1-2 % and 2,1-3 % categories, considerably affecting the quality of agricultural production.

Compared to 2020, Comarna, one of the most affected localities previously, recorded a drastic decrease in infestation, while Prisăcani and Dolhești became critical points of the spread of the pest.

In conclusion, the data highlight the need for effective phytosanitary protection measures, especially in areas with severe attack, where the impact on crops is considerable. The variable spread of the infestation suggests the influence of climatic and agronomic factors, and future interventions should be adapted specifically to each region to reduce crop losses.

In 2022, the analysis of the frequency of grains infested by *Eurygaster spp*. in the localities of the Comarna area shows a decrease in the total quantity of grains analyzed (2048 kg, compared to 3007 kg in 2021), but also a different distribution of the pest attack.

All the samples analyzed were affected by the attack, with no grains without infestation being recorded. Prisăcani remains the most affected locality, with 1083 kg

of grains attacked, of which over 50 % are classified in the 0.1-1 % category, and 180 kg were classified in the 2,1-3 % category, indicating a moderate degree of infestation. Also, in Costuleni, the attack was significant, with 410 kg of grains affected, most of which were classified in the 1,1-2 % and 2,1-3 % categories (Tab. 3).

In contrast, the localities of Răducăneni, Dolhești, Moșna, Grozești and Țuțora recorded relatively small amounts of attacked grains, predominantly in the 0,1-1 % and 1,1-2 % categories, suggesting a low impact on agricultural production. Gorban and Comarna had the lowest infestation levels, with only 5 kg and 29 kg of affected grains.

Compared to the previous year, a reduction in the severity of the attack is noted in many localities, with a significant decrease in grains falling into the 2,1-3 % category (340 kg compared to 1882 kg in 2021) and those in the 3,1-4 % category (40 kg compared to 100 kg in 2021).

This trend suggests a possible efficiency of the control measures applied or less favorable climatic conditions for the development of the pest.

Table 3

The results of the analyzes regarding the frequency (%) of the grains pricked by *Eurygaster* spp. in 2022

No.	Location	Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)	Frequency of infestation (F %)			
					0,1-1%	1,1-2%	2,1-3%	3,1-4%
1.	Prisăcani	**1083**	0	1083	550	313	180	40
2.	Răducăneni	**38**	0	38	30	8	0	0
3.	Dolhești	**45**	0	45	30	15	0	0
4.	Moșna	**30**	0	30	10	20	0	0
5.	Grozești	**80**	0	80	45	35	0	0
6.	Țuțora	**112**	0	112	70	42	0	0
7.	Gorban	**5**	0	5	3	2	0	0
8.	Comarna	**29**	0	29	20	9	0	0
9.	Costuleni	**410**	0	410	0	250	160	0
10.	Cozmești	**216**	0	216	116	100	0	0

In conclusion, although the *Eurygaster* spp. attack was present in all the analyzed localities, its overall impact was lower compared to previous years. Areas with severe infestation, such as Prisăcani and Costuleni, still require protection measures, but the general trend shows a decrease in the pest pressure on crops.

In 2023, the analysis of the frequency of grains infested by *Eurygaster spp*. in the localities in the Comarna area indicates a significant decrease in the total quantity of grains analyzed compared to previous years, reaching 1460 kg. However, the pest attack remained at a high level, with only 70 kg of grains being unaffected, and the remaining 1390 kg showing varying degrees of infestation (Tab. 4).

The most affected localities were Prisăcani, Grozești, Țuțora and Gorban, where most of the attacked grains were classified in the 0,1-1 % and 1,1-2 % categories, and in the case of Prisăcani, over 60 % of the infested production was in the 2,1-3 % category, indicating a considerable impact on the quality of the harvest. Costuleni was the only locality where grains in the 3,1-4 % category were recorded, although in reduced quantity. In contrast, in Moșna and Cozmești, the attack was less severe, being among the few areas where unaffected grains were reported.

Compared to previous years, the data show a reduction in the intensity of the attack in the higher infestation categories, signaling either a greater efficiency of the control measures or less favorable conditions for the development of the pest.

However, the presence of the attack in all analyzed localities highlights the need for ongoing strategies to protect crops and reduce the economic impact on agricultural producers.

Table 4

The results of the analyzes regarding the frequency (%) of the grains pricked by *Eurygaster* spp. in 2023

No.	Location	Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)	Frequency of infestation (F %)			
					0,1-1 %	1,1-2 %	2,1-3 %	3,1-4 %
1.	Prisăcani	400	0	400	0	150	250	0
2.	Răducăneni	110	0	110	90	20	0	0
3.	Dolhești	70	10	60	0	52	8	0
4.	Moșna	60	20	40	40	0	0	0
5.	Grozești	180	0	180	130	50	0	0
6.	Țuțora	190	0	190	110	80	0	0
7.	Gorban	160	0	160	100	60	0	0
8.	Comarna	100	0	100	60	40	0	0
9.	Costuleni	130	0	130	20	40	60	10
10.	Cozmești	60	40	20	10	10	0	0

In 2024, the analysis of the frequency of grains infested with *Eurygaster spp*. in the Comarna area indicates a significant decrease in infestation compared to previous years, both in terms of the total number of grains analyzed (1298 kg) and in terms of the severity of the attack (Tab. 5). Although a considerable number of affected grains (1138 kg) is still recorded, their distribution shows a preponderance of the attack in the 0,1-1 % and 1,1-2 % categories, which suggests a decrease in the intensity of the infestation.

Table 5

The results of the analyzes regarding the frequency (%) of the grains pricked by *Eurygaster* spp. in 2024

No.	Location	Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)	Frecvency of infestation (F %)			
					0,1-1 %	1,1-2 %	2,1-3 %	3,1-4 %
1.	Prisăcani	130	0	130	0	80	40	10
2.	Răducăneni	60	40	20	0	15	5	0
3.	Dolhești	70	40	30	15	15	0	0
4.	Moșna	10	0	10	5	5	0	0
5.	Grozești	148	0	148	110	38	0	0
6.	Țuțora	90	0	90	0	55	35	0
7.	Gorban	410	0	410	210	170	30	0
8.	Comarna	120	80	40	25	15	0	0
9.	Costuleni	190	0	190	100	90	0	0
10.	Cozmești	70	0	70	40	30	0	0

The most affected localities were Gorban, Costuleni and Grozești, where over 100 kg of berries were attacked, most of them falling into the lower infestation categories. Prisăcani, although affected, has a lower number of berries falling into

the 2,1-3 % category (40 kg) and only 10 kg in the 3,1-4 % category, which marks an improvement compared to previous years.

In contrast, the localities of Moșna, Răducăneni, Dolhești and Comarna recorded low levels of infestation, and in Răducăneni and Dolhești, a significant part of the production was completely free of attack.

This positive trend suggests a possible efficiency of the control measures or less favorable climatic conditions for the pest.

Compared to previous years, a reduction in severe infestation is noted, with only 10 kg of berries falling into the 3,1-4 % category. This indicates a stabilization of the situation and a possible return of crops to a higher level of safety.

However, the persistence of the attack in all the analyzed localities emphasizes the need for careful monitoring and continuous preventive measures to avoid the recurrence of massive infestations in the coming years.

The analysis of the degree of attack caused by *Eurygaster spp*. on wheat grains in the research area, in the period 2020-2024, highlights a significant infestation, with variations in both the total quantity of grains analyzed and the distribution of the attack by intensity categories.

It is observed that, in all the years analyzed, the proportion of unaffected grains was reduced, which indicates a constant presence of the pest in wheat crops.

In some cases, such as the example of the 2670 kg lot analyzed, over 96 % of the grains were affected, which underlines the major impact of bedbugs on production (Tab. 6).

The most affected categories were generally 1,1-2 % and 2,1-3 %, with significant shares, which suggests that the infestation did not manifest itself predominantly in mild forms, but had a considerable impact on the quality of the wheat.

Another important aspect is the distribution of the attack according to severity. For example, plots with an attack of 3.1-4 %, indicating a high level of damage, were more frequent in some situations, even exceeding 34 % in one case, which could indicate either a vulnerability of certain crops or favorable conditions for the development of the pest in certain periods.

In contrast, other plots recorded a more moderate attack, with lower weights for the higher infestation categories, suggesting a possible efficiency of the control measures applied.

Overall, the data reflect an extensive and recurrent infestation, highlighting the need for constant prevention and control measures to limit the economic impact on agricultural producers and maintain wheat quality at an optimal level.

CONCLUSIONS

1. The attack of wheat grains attacked by *Eurygaster spp*. (2020-2024) varied between localities and years, but in general, the highest share of affected grains was in the infestation categories of 1,1-2 % and 2,1-3 %, which suggests a moderate to severe impact on wheat quality, especially in areas such as Prisăcani, Costuleni and Dolhești. Localities such as Prisăcani and Costuleni recorded the largest quantities of attacked grains, with a high degree of infestation, while other localities (Moșna, Răducăneni, Țuțora) showed a lower impact of the attack.

2. In 2024, there was a significant decrease in infestation compared to previous years, both in terms of the quantity of affected grains and the degree of infestation. In localities such as Răducăneni, Dolhești and Moșna, a decrease in the

number of attacked berries was observed, indicating the possible effectiveness of the implemented control measures.

3. Compared to previous years, 2024 marked a reduction in severe infestation, with a significant decrease in berries in the 2,1-3 % and 3,1-4 % categories. This suggests an improvement in conditions or a greater efficiency of phytosanitary interventions.

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Table 6

The percentage of attack degree (%) produced by *Eurygaster* spp. on wheat grains in the research area during the period 2020-2024

Total quantity analyzed (kg)	Quantity attacked (kg)	Quantity unattacked (kg)		Din care:							
				0,1-1%	%	1,1-2%	%	2,1-3%	%	3,1-4%	%
			%								
2670	85	2585	100	37	0,70	540	29,12	1006	52,26	103	32,18
898	140	758	100	212	2,79	333	17,96	103	5,55	110	34,37
1422	10	1412	100	567	40,15	468	25,24	303	16,34	74	23,12
1125	35	1090	100	398	36,51	355	25,14	306	16,50	31	9,69
1020	177	843	100	335	39,73	158	8,52	348	18,77	2	0,62