ANNALS OF THE UNIVERSITY OF CRAIOVA

Series: ✓*Biology*
✓*Horticulture*
✓*Food products processing technology*
✓*Environmental engineering*

Vol. XXXI (LXVII) - 2026

DYNAMICS AND CONTROL OF CHAETOCNEMA TIBIALIS POPULATION IN SUGAR BEET UNDER CLIMATIC AND AGRONOMIC CONDITIONS IN THE BRAȘOV DEPRESSION

Adam (Hristea) Lorena[1*], Hermeziu Manuela[1]
[1*]National Institute of Research and Development for Potato and Sugar Beet Brasov
* *Correspondence author. E-mail*: adam_lorena98@yahoo.com

Keywords*: Chaetocnema tibialis, climatic conditions, sugar beet, hybrids, insecticide.*

ABSTRACT

This study was carried out during 2024-2025 at NIRDPSB Brasov to evaluate the attack of Chaetocnema tibialis on eight sugar beet hybrids and the efficacy of insecticide treatments under field conditions. The results showed clear differences in infestation depending on the year, assessment date and hybrid. In 2024, the attack was higher during the early growing period, whereas in 2025 infestation increased markedly in June, followed by a decline toward the end of the season. However, flea beetle activity remained present even in late August. The insecticides Decis Expert 100 EC, Vantex and Faster Gold 50 EC were effective immediately after application, significantly reducing pest density. Subsequent evaluations at 3, 7 and 14 days after treatment indicated a gradual decrease in residual efficacy. Differences among hybrids suggest a differentiated response in relation to both initial infestation and reinfestation dynamics. The results highlight the importance of continuous monitoring and timely crop protection measures in sugar beet.

INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is an important and profitable industrial crop cultivated primarily for sugar production. In Europe, sugar beet is cultivated on approximately 2,000,000 ha, accounting for about 70 % of the global sugar beet production area. The crop has a relatively long growing season, lasting up to 200 days, during which plants may be exposed to a wide range of diseases and insect pests that can adversely affect crop productivity and quality (Viric Gašparić et al., 2021; Yamane, 2016). In particular, phytophagous insects may cause substantial damage during the early stages of crop development, when young plants are more vulnerable to the loss of foliar tissue and have a limited capacity to compensate for feeding damage.

Throughout the growing season, sugar beet is attacked by a diverse range of insects that may negatively affect yield, sugar content and root quality. Among the important early-season pests is *Chaetocnema tibialis* (Illiger, 1807) (Coleoptera: Chrysomelidae), commonly known as the sugar beet flea beetle. The species belongs to the flea beetle genus *Chaetocnema Stephens* and is included among the Palearctic species associated with sugar beet. Its taxonomic status, diagnostic

characteristics and host-plant associations have been comprehensively reviewed by Konstantinov et al. (2011).

Damage is caused mainly by adults, which feed on the foliar tissues of young plants. Feeding results in the formation of numerous small, rounded perforations in the leaf lamina, giving affected plants a characteristic shot-hole appearance. Under favorable conditions and at high population densities, extensive feeding may lead to severe defoliation, impaired plant growth and, in extreme cases, the death of young plants. Consequently, the period immediately following crop emergence represents a particularly critical stage with regard to *C. tibialis* infestation (Kereši et al., 2006).

The occurrence and intensity of flea beetle damage are influenced by environmental and cropping conditions. Temperature and precipitation may affect adult activity, pest abundance and the susceptibility of young plants to damage. Variations in climatic conditions between growing seasons may therefore result in considerable differences in the intensity and temporal dynamics of pest infestation. The importance of environmental conditions in determining pest pressure is particularly relevant when assessing *C. tibialis* populations under field conditions.

The economic importance of flea beetles in sugar beet production has also been demonstrated by field experiments conducted in different European regions. Studies have investigated both the occurrence of *C. tibialis* and various crop protection strategies aimed at reducing early-season damage. In particular, seed treatment has been evaluated as an effective method for protecting young sugar beet plants against *C. tibialis* and other economically important pests (Lemić et al., 2024).

Recent research has also focused on alternative and more sustainable approaches to flea beetle management. Two-year field experiments conducted in Northern Italy demonstrated that trap cropping could reduce flea beetle damage to sugar beet by approximately 40 %, highlighting the potential of agroecological strategies for reducing early-season pest pressure and the need for insecticide applications (Scagliarini et al., 2023).

MATERIAL AND METHODS

A field experiment with three replications was conducted at the National Institute for Research and Development for Potato and Sugar Beet (NIRDPSB) Brașov during 2024–2025, with the aim of evaluating the agronomic performance of several sugar beet hybrids and assessing the impact of *Chaetocnema tibialis* on sugar beet plants in the south-eastern region of Transylvania. The total experimental area was 842.4 m², and eight sugar beet hybrids were evaluated: Smart Rossada – KWS, Spiner Smart Conviso – SESVanderHave, Terrapin Smart Conviso – SESVanderHave, Nevis – SESVanderHave, Caroll – D&S GmbH, Clemens – D&S GmbH, Mobius – Maribo, and Music – Maribo.

The field experiment was conducted according to conventional sugar beet cultivation practices. In 2024, the preceding crop was winter wheat. Following wheat harvesting, the soil was disk-harrowed, followed by the application of 1,000 kg/ha TerraCalco 95, containing 97.8 % CaO, for soil pH correction. Deep ploughing was subsequently performed on 25 October 2023. In spring 2024, on 23 February, NPK 15:15:15 + 8 SO_3 + Zn fertilizer was applied at a rate of 1000 kg/ha. The fertilizer was incorporated into the soil using a Lely rotary tiller, which also ensured seedbed preparation. On 28 March 2024, the pre-emergence herbicide Dual Gold 960 EC, containing S-metolachlor at a concentration of 960 g/L, was applied at a rate of 1.5 L/ha and subsequently incorporated into the soil using the Lely rotary tiller.

In 2025, the preceding crop for sugar beet was pea (*Pisum sativum* L.). Following pea harvesting, the field was prepared by disk-harrowing to chop and incorporate the plant residues, followed by deep ploughing to a depth of approximately 28–30 cm on 11 November 2024. In spring 2025, the soil was prepared using a cultivator, followed by the application of compound NPK 15:15:15 fertilizer at a rate of 1000 kg/ha on 11 March 2025. The fertilizer was incorporated into the soil using the Lely rotary tiller, which also ensured adequate seedbed preparation. On 24 March 2025, the pre-emergence herbicide Frontier Forte, containing dimethenamid-P at a concentration of 720 g/L, was applied at a rate of 1 L/ha and subsequently incorporated into the soil during an additional pass with the Lely rotary tiller.

Following seedbed preparation, sowing was carried out on 29 March 2024 and 7 April 2025, respectively, using a six-row precision seeder. Sowing was performed at a depth of 2 cm, with an inter-row spacing of 45 cm and an intra-row plant spacing of 18 cm. Each experimental variant within each replication was sown in six rows, with a length of 11 m and a width of 2.7 m, resulting in an experimental plot area of 29.7 m².

The experimental field was yielded on the 25th of October 2024 respectively 13th October 2025. The results were reported at hectare surface.

Calculations and results interpretation were done after consecrated statistical methods like variance analysis. For differences significance, the t test was used, with limit differences calculations for the significance thresholds of 5, 1 and 0,1 %. The Duncan multiple comparison test was also used, using each variant as witness for the all of the others (ANOVA program).

RESULTS AND DISCUSSIONS

Climatic conditions

The climatic conditions during the two agricultural years showed important differences, particularly in terms of the thermal regime, precipitation amount, and precipitation distribution, which may have influenced both sugar beet development and the dynamics of *Chaetocnema tibialis* infestation. This pest is particularly important during the early stages of sugar beet development, when plants are more susceptible to leaf area loss. Higher temperatures favor adult activity, while warm and dry periods may contribute to increased infestation levels (Francis et al., 2022).

In the 2023–2024 agricultural year, the winter period was characterized by considerably higher temperatures than the long-term average, with a mean temperature of 3.8 °C, compared with –0.8 °C, representing a positive deviation of 4.6 °C. The precipitation regime was deficient, with a total of 156.9 mm, which was 18.8 mm below the long-term average. During the growing season, the precipitation deficit persisted, while elevated temperatures were particularly pronounced in June, when the thermal deviation reached +4.6°C. The combination of high temperatures and reduced precipitation favored the development of both atmospheric and soil drought. These conditions may have favored the activity of *C. tibialis* while simultaneously increasing water stress in young plants and reducing their capacity to compensate for pest damage. Studies on the population dynamics of this species indicate that periods of reduced precipitation may be associated with higher population levels of *C. tibialis* (Cagáň et al., 2006).

In the 2024–2025 agricultural year, the thermal regime was also above the long-term average; however, precipitation conditions were more favorable. During the growing season, the mean air temperature was 15.2 °C, which was 0.9 °C above the long-term average of 13.7 °C, while total precipitation amounted to 504.7 mm, compared with the long-term average of 496.3 mm. Nevertheless, precipitation was unevenly distributed throughout the growing season. In April, a precipitation deficit of 25.7 mm was recorded, while precipitation amounts were also low in June and August, favoring the occurrence of periods of drought. Although precipitation in July exceeded the long-term average by 9.7 mm, approximately 90 % of the total monthly precipitation occurred within only five days. Therefore, periods characterized by high temperatures and reduced moisture availability also occurred during this year and may have favored *C. tibialis* activity; however, overall water availability was more favorable for the crop than in the previous year.

Overall, the 2023–2024 agricultural year was warmer and drier, presenting potentially more favorable conditions for a higher incidence of *C. tibialis* infestation, whereas the 2024–2025 agricultural year was characterized by a precipitation regime closer to the long-term average. Differences in temperature and, particularly, in water availability and precipitation distribution influenced crop growth conditions and the plants' ability to withstand pest attack.

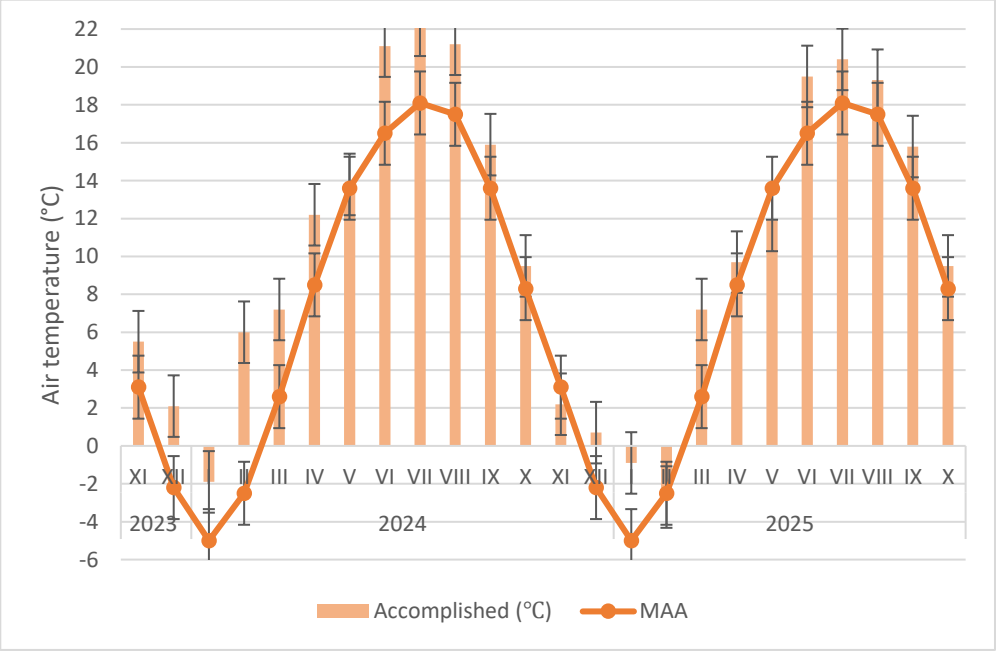


Figure 1. Monthly mean air temperature in Brașov
(1st of November, 2023 -31st of Octomber 2025)

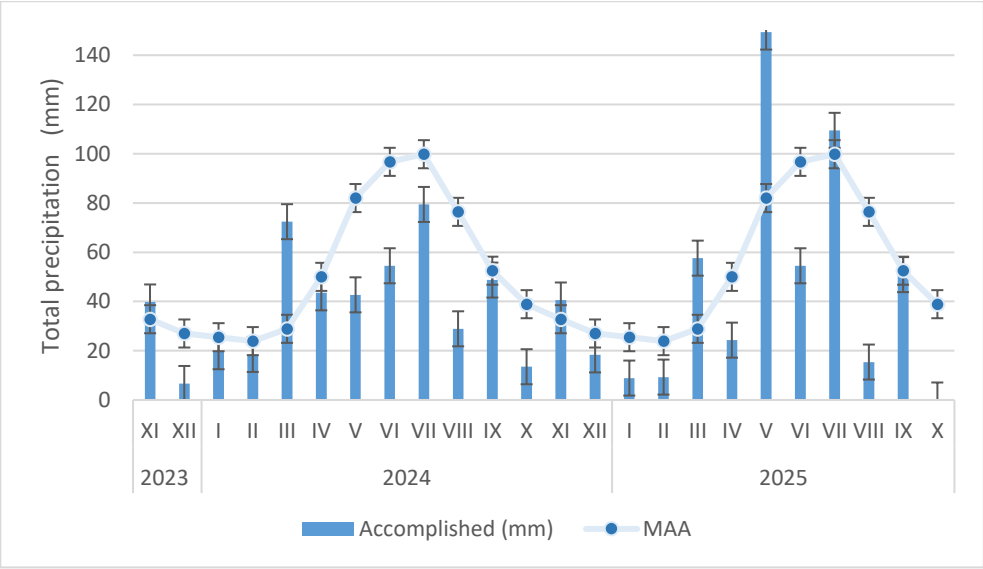


Figure 2. Monthly precipitation in Brașov
(1st of November, 2023 -31st of October 2025)

Population dynamics of *Chaetocnema tibialis* during the growing season

The analysis of the mean number of plants attacked by *Chaetocnema tibialis* revealed pronounced variation both among the hybrids evaluated and across assessment dates. In 2024, at the first assessment, conducted on 29 April, the highest mean numbers of attacked plants were recorded for the hybrids Music (28.5 plants), Caroll (19.1 plants), and Clemens (16.1 plants), whereas Smart Rossada exhibited the lowest value (5.1 attacked plants). At the assessment conducted on 20 May 2024, the mean number of attacked plants showed an overall decreasing trend, with the highest values recorded for Music (18.6 plants), Clemens (14.2 plants), and Caroll (13.5 plants).

In 2025, the assessment conducted on 19 May indicated a lower level of *C. tibialis* infestation compared with the previous year, with an overall mean of 6.9 attacked plants. The lowest values were recorded for the hybrids Smart Rossada (3.2 plants) and Terrapin Smart Conviso (3.6 plants), whereas Clemens exhibited the highest value (13.6 plants), followed by Music (9.9 plants) and Caroll (7.6 plants). These results indicate a differential response to *C. tibialis* infestation among the hybrids evaluated.

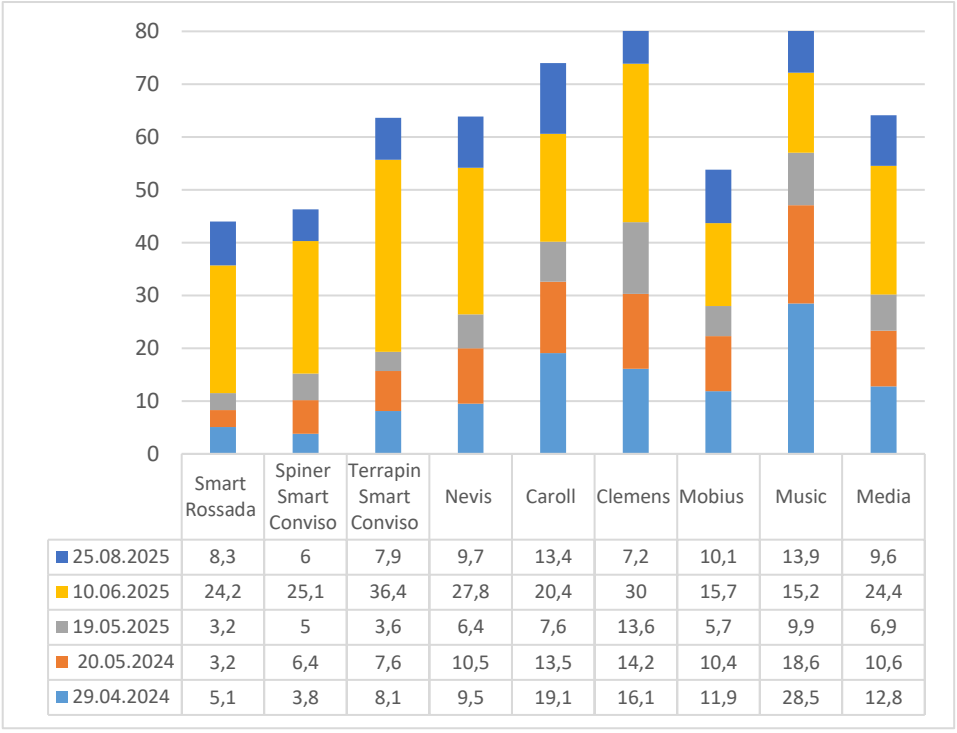
A marked increase in infestation was observed at the assessment conducted on 10 June 2025, when the overall mean number of attacked plants increased to 24.4 plants. The highest value was recorded for hybrid Terrapin Smart Conviso, with 36.4 attacked plants, followed by Clemens (30.0 plants), Nevis (27.8 plants), and Spiner Smart Conviso (25.1 plants). The pronounced increase compared with the assessment conducted on 19 May 2025 indicates a substantial intensification of *C. tibialis* infestation during this period, with June representing the period of highest infestation pressure recorded during the 2025 assessments.

The meteorological conditions characterized by lower temperatures and high atmospheric humidity recorded towards the end of August 2025 may have favored the

presence and activity of adult *Chaetocnema tibialis* during the latter part of the growing season. Nevertheless, the assessment conducted in August revealed a considerable decrease in the mean number of attacked plants across all hybrids. Thus, the overall mean decreased from 24.4 attacked plants in June to 9.6 plants in August. The lowest values were recorded for the hybrids Spiner Smart Conviso (6.0 plants), Clemens (7.2 plants), and Terrapin Smart Conviso (7.9 plants), whereas the highest values were recorded for Music (13.9 plants), Caroll (13.4 plants), and Mobius (10.1 plants).

Overall, a comparison between the two years indicates that the infestation pressure exerted by *Chaetocnema tibialis* was generally higher in 2024 during the early assessment period, whereas in 2025 infestation levels were initially lower but increased markedly by June, reaching the highest mean value recorded across the two years, followed by a substantial decline towards the end of the growing season.

.



	Smart Rossada	Spiner Smart Conviso	Terrapin Smart Conviso	Nevis	Caroll	Clemens	Mobius	Music	Media
25.08.2025	8,3	6	7,9	9,7	13,4	7,2	10,1	13,9	9,6
10.06.2025	24,2	25,1	36,4	27,8	20,4	30	15,7	15,2	24,4
19.05.2025	3,2	5	3,6	6,4	7,6	13,6	5,7	9,9	6,9
20.05.2024	3,2	6,4	7,6	10,5	13,5	14,2	10,4	18,6	10,6
29.04.2024	5,1	3,8	8,1	9,5	19,1	16,1	11,9	28,5	12,8

Figure 3. Mean number of sugar beet plants infested by flea beetles at NIRDPSB Brașov



Figure 4-7. Sugar beet plants infested by Chaetocnema tibialis in the experimental field at Brașov (Source: L. Adam)

The data presented in table 1 highlight that the initial flea beetle infestation varied among the hybrids analyzed, ranging from 4.00 individuals/5 plants in the Smart Rossada hybrid to 10.50 individuals/5 plants in the Music hybrid. Relatively high initial attack levels were also recorded in the Caroll (10.00 individuals/5 plants), Clemens (8.50 individuals/5 plants), and Nevis (7.25 individuals/5 plants) hybrids, indicating differential pest pressure depending on the hybrid.

At 1 day after treatment with Decis Expert 100 EC, the number of flea beetles decreased markedly in all hybrids, with the lowest values recorded in Smart Rossada, Spiner Smart Conviso, and Terrapin Smart Conviso (0.25 individuals/5 plants), and the highest in Music (1.25 individuals/5 plants) and Caroll (1.00 individuals/5 plants). These results demonstrate the rapid efficacy of the product immediately after application.

Assessments performed at 3, 7, and 14 days after treatment showed a gradual increase in flea beetle population density across all hybrids, reflecting the progressive decline of the residual effect. At 14 days after treatment, the lowest values were recorded in Terrapin Smart Conviso (1.00 individuals/5 plants) and in Smart Rossada, Nevis, and Caroll (1.50-2.25 individuals/5 plants), whereas the highest value was observed in Music hybrid (3.00 individuals/5 plants).

Table 1.

Biological efficacy of the insecticide Decis Expert 100 EC (0.75 l/ha) in controlling sugar beet flea beetles (Brasov, 15.04.2024)

Hybrid	No. of Ch. t. individuals per 5 plants					Population density after treatment (%) relative to the initial population				Population reduction relative to the untreated variant (%) at n ... days after treatment			
		At ... days after treatment											
	Before treatment	1	3	7	14	1	3	7	14	1	3	7	14
Smart Rossada	4.00	0.25	0.50	1.25	1.50	6.25	12.50	31.25	37.50	93.75	87.50	68.75	62.50
Spiner Smart Conviso	6.50	0.25	0.50	1.25	1.75	3.85	7.69	19.23	26.92	96.15	92.31	80.77	73.08
Terrapin Smart Conviso	5.00	0.25	0.50	0.75	1.00	5.00	10.00	15.00	20.00	95.00	90.00	85.00	80.00
Nevis	7.25	0.50	1.00	1.50	1.75	6.90	13.79	20.69	24.14	93.10	86.21	79.31	75.86
Caroll	10.00	1.00	1.25	1.75	2.25	10.00	12.50	17.50	22.50	90.00	87.50	82.50	77.50
Clemens	8.50	0.25	0.75	1.25	2.00	2.94	8.82	14.71	23.53	97.06	91.18	85.29	76.47
Mobius	7.25	0.75	1.00	1.25	1.75	10.34	13.79	17.24	24.14	89.66	86.21	82.76	75.86
Music	10.50	1.25	1.75	2.00	3.00	11.90	16.67	19.05	28.57	88.10	83.33	80.95	71.43

At the second assessment in 2024, the initial intensity of flea beetle infestation differed among the hybrids analyzed, with values ranging from 3.25 individuals/5 plants in the Smart Rossada hybrid to 10.50 individuals/5 plants in the Clemens hybrid. In addition, relatively high initial infestation levels were recorded in the Nevis (10.00 individuals/5 plants), Caroll (9.50 individuals/5 plants), and Mobius (9.25 individuals/5 plants) hybrids, suggesting a non-uniform pest occurrence depending on the genotype analyzed (Table 2). At 1 day after Vantex application, a marked reduction in flea beetle population was observed across all studied hybrids, with values decreasing to 0.25-0.75 individuals/5 plants. The lowest values were recorded in the Caroll, Clemens, and Mobius hybrids (0.25 individuals/5 plants), whereas the highest values were observed in Spiner Smart Conviso and Nevis (0.75 individuals/5 plants). These results indicate a rapid insecticidal action, with a clearly visible effect immediately after treatment. Assessments performed at 3, 7, and 14 days after application revealed a progressive increase in flea beetle population density in all experimental variants, reflecting a gradual decline in the biological persistence of the product. At the final assessment, performed 14 days after treatment, the lowest values were recorded in Caroll (1.25 individuals/5 plants) and Terrapin Smart Conviso (1.50 individuals/5 plants), whereas the highest population densities were observed in Nevis (3.00 individuals/5 plants) and Mobius (2.75 individuals/5 plants). The Clemens and Music hybrids showed intermediate values of 2.50 and 2.25 individuals/5 plants, respectively.

Table 2.

Biological efficacy of the insecticide Vantex (0.8 l/ha) in controlling sugar beet flea beetles (Brasov, 07.06.2024)

Hybrid	No. of Ch. t. individuals per 5 plants					Population density after treatment (%) relative to the initial population				Population reduction relative to the untreated variant (%) at n ... days after treatment			
		At ... days after treatment											
	Before treatment	1	3	7	14	1	3	7	14	1	3	7	14
Smart Rossada	3.25	0.50	0.75	1.25	2.00	15.38	23.08	38.46	61.54	84.62	76.92	61.54	38.46
Spiner Smart Conviso	6.00	0.75	1.00	1.50	1.75	12.50	16.67	25.00	29.17	87.50	83.33	75.00	70.83
Terrapin Smart Conviso	5.50	0.50	0.75	1.25	1.50	9.09	13.64	22.73	27.27	90.91	86.36	77.27	72.73
Nevis	10.00	0.75	1.00	1.75	3.00	7.50	10.00	17.50	30.00	92.50	90.00	82.50	70.00
Caroll	9.50	0.25	0.75	1.00	1.25	2.63	7.89	10.53	13.16	97.37	92.11	89.47	86.84
Clemens	10.50	0.50	1.00	1.50	2.50	4.76	9.52	14.29	23.81	95.24	90.48	85.71	76.19
Mobius	9.25	0.25	0.75	1.00	2.75	2.70	8.11	10.81	29.73	97.30	91.89	89.19	70.27
Music	8.50	0.50	1.00	1.25	2.25	5.88	11.76	14.71	26.47	94.12	88.24	85.29	73.53

The treatments applied with Decis Expert 100 EC and Vantex proved effective in reducing flea beetle populations in the hybrids analyzed; however, the variations recorded among hybrids suggest a differential response determined by both the initial infestation level and the persistence of the insecticidal effect, as well as by the rate of reinfestation after treatment.

Table 3 highlights the variation in the initial level of flea beetle infestation among the studied hybrids, with values ranging from 2.75 individuals/5 plants in Smart Rossada to 10.50 individuals/5 plants in Clemens. A relatively high level of attack prior to treatment was also recorded in Music (8.25 individuals/5 plants), Caroll (6.25 individuals/5 plants), and Spiner Smart Conviso (6.00 individuals/5 plants), suggesting an uneven distribution of the pest within the biological material analyzed.

At 24 hours after the application of the insecticide Decis Expert 100 EC, a pronounced decline in flea beetle population was observed across all experimental variants. The lowest values were recorded in Smart Rossada, Spiner Smart Conviso, Nevis, Caroll, and Mobius (0.25 individuals/5 plants), whereas Terrapin Smart Conviso, Clemens, and Music showed values of 0.50 individuals/5 plants. These results confirm the rapid action of the product and its ability to significantly reduce pest density immediately after treatment.

The analysis of successive assessments performed at 3, 7, and 14 days after treatment revealed a gradual increase in the number of individuals in all hybrids, indicating a progressive decline in the residual effect of the insecticide. At the final assessment, the lowest densities were maintained in Smart Rossada, Nevis, and Caroll (1.50 individuals/5 plants), followed by Spiner Smart Conviso and Terrapin Smart Conviso (1.75 individuals/5 plants), while Clemens recorded the highest value, namely 2.25 individuals/5 plants, together with Mobius and Music, which showed the same level.

Table 3.

Biological efficacy of the insecticide Decis Expert 100 EC (0.75 l/ha) in controlling sugar beet flea beetles (Brasov, 29.04.2025)

Hybrid	No. of Ch. t. individuals per 5 plants					Population density after treatment (%) relative to the initial population				Population reduction relative to the untreated variant (%) at n ... days after treatment			
		At ... days after treatment											
	Before treatment	1	3	7	14	1	3	7	14	1	3	7	14
Smart Rossada	2.75	0.25	0.50	0.75	1.50	9.09	18.18	27.27	54.55	90.91	81.82	72.73	45.45
Spiner Smart Conviso	6.00	0.25	0.75	1.25	1.75	4.17	12.50	3.25	29.17	95.83	87.50	96.75	70.83
Terrapin Smart Conviso	3.00	0.50	0.75	1.50	1.75	16.67	25.00	50.00	58.33	83.33	75.00	50.00	41.67
Nevis	5.25	0.25	0.50	1.00	1.50	4.76	9.52	19.05	28.57	95.24	90.48	80.95	71.43
Caroll	6.25	0.25	0.75	1.25	1.75	4.00	12.00	20.00	28.00	96.00	88.00	80.00	72.00
Clemens	10.50	0.50	0.75	1.50	2.25	4.76	7.14	14.29	21.43	95.24	92.86	85.71	78.57
Mobius	5.00	0.25	0.50	1.00	2.00	5.00	10.00	20.00	40.00	95.00	90.00	80.00	60.00
Music	8.25	0.50	1.00	1.25	2.25	6.06	12.12	15.15	27.27	93.94	87.88	84.85	72.73

Within the second assessment during the first part of the growing season, treatment with Faster Gold 50 EC showed a clear trend of a marked reduction in the flea beetle population immediately after application, followed by a gradual increase in population density at the subsequent evaluations. This pattern reflects the high initial efficacy of the product and the progressive decline of its residual effect, together with the occurrence of differences among hybrids in terms of the rate of reinfestation (Table 4).

Table 4.

Biological efficacy of the insecticide Faster Gold 50 EC (0.15 l/ha) in controlling sugar beet flea beetles (Brasov, 20.05.2025)

Hybrid	No. of Ch. t. individuals per 5 plants					Population density after treatment (%) relative to the initial population				Population reduction relative to the untreated variant (%) at n ... days after treatment			
		At ... days after treatment											
	Before treatment	1	3	7	14	1	3	7	14	1	3	7	14
Smart Rossada	6.50	0.25	0.50	0.75	1.25	3.85	7.69	11.54	19.23	96.15	92.31	88.46	80.77
Spiner Smart Conviso	7.25	0.50	0.75	1.00	1.50	6.90	10.34	3.25	20.69	93.10	89.66	96.75	79.31
Terrapin Smart Conviso	9.75	0.50	0.75	1.50	2.75	5.13	7.69	15.38	28.21	94.87	92.31	84.62	71.79
Nevis	7.75	0.25	0.50	1.25	2.25	3.23	6.45	16.13	29.03	96.77	93.55	83.87	70.97
Caroll	5.50	0.25	0.50	0.75	1.25	4.55	9.09	13.64	22.73	95.45	90.91	86.36	77.27
Clemens	8.50	0.50	0.75	1.25	2.00	5.88	8.82	14.71	23.53	94.12	91.18	85.29	76.47
Mobius	5.25	0.25	0.50	1.00	1.25	4.76	9.52	19.05	23.81	95.24	90.48	80.95	76.19
Music	4.75	0.25	0.50	0.75	1.25	5.26	10.53	15.79	26.32	94.74	89.47	84.21	73.68

Within the third assessment in 2025, the data highlight the presence of a relatively high flea beetle infestation at the end of August, suggesting that pest activity was maintained toward the end of the growing season. Among the hybrids analyzed, Music was distinguished by a higher degree of susceptibility, as it recorded the highest flea beetle population density at the final assessment, namely 2.25 individuals/5 plants, as well as the lowest value of biological efficacy. In contrast, the Smart Rossada hybrid showed a more favorable response to pest attack, maintaining a lower level of infestation after treatment, which suggests relatively better tolerance under the given experimental conditions (Table 5).

Table 5.

Biological efficacy of the insecticide Decis Expert 100 EC (75 ml/ha) in controlling sugar beet flea beetles (Brasov, 25.08.2025)

Hybrid	No. of Ch. t. individuals per 5 plants					Population density after treatment (%) relative to the initial population				Population reduction relative to the untreated variant (%) at n ... days after treatment			
		At ... days after treatment											
	Before treatment	1	3	7	14	1	3	7	14	1	3	7	14
Smart Rossada	3.00	0.25	0.50	1.00	1.25	8.33	16.67	33.33	41.67	91.67	83.33	66.67	58.33
Spiner Smart Conviso	2.50	0.50	0.75	1.00	1.25	20.00	30.00	3.25	50.00	80.00	70.00	96.75	50.00
Terrapin Smart Conviso	3.25	0.25	0.50	1.25	1.50	7.69	15.38	38.46	46.15	92.31	84.62	61.54	53.85
Nevis	2.50	0.25	0.50	0.75	1.00	10.00	20.00	30.00	40.00	90.00	80.00	70.00	60.00
Caroll	3.25	0.50	0.75	1.00	1.75	15.38	23.08	30.77	53.85	84.62	76.92	69.23	46.15
Clemens	3.00	0.50	0.75	1.25	2.00	16.67	25.00	41.67	66.67	83.33	75.00	58.33	33.33
Mobius	2.75	0.25	0.50	0.75	1.25	9.09	18.18	27.27	45.45	90.91	81.82	72.73	54.55
Music	3.00	0.50	1.00	1.25	2.25	16.67	33.33	41.67	75.00	83.33	66.67	58.33	25.00

CONCLUSIONS

The experimental results obtained during 2024–2025 demonstrated that *Chaetocnema tibialis* represents an important pest of sugar beet under the agroecological conditions of the Brașov depression. Pest infestation varied according to the growing season, assessment timing, and hybrid, indicating the combined influence of environmental conditions and host-plant characteristics on pest population dynamics.

In 2024, infestation pressure was higher during the early stages of crop development, whereas in 2025 pest abundance was initially lower but increased markedly in June, when the highest infestation pressure of the experimental period was recorded. The persistence of pest activity until late August 2025 further indicates that *C. tibialis* may remain active during the later stages of crop development.

Applications of insecticides Decis Expert 100 EC, Vantex, and Faster Gold 50 EC resulted in a rapid and pronounced reduction in flea beetle abundance immediately after treatment, confirming their high short-term biological efficacy. However, the progressive increase in pest density at 3, 7, and 14 days after treatment indicated a gradual decline in residual efficacy and subsequent population recovery.

The differences observed among the tested hybrids indicate a differential response to *C. tibialis* infestation, expressed through variations in initial pest abundance and post-treatment reinfestation dynamics. Therefore, effective management of *C. tibialis* requires continuous crop monitoring, timely implementation of plant protection measures, and adaptation of control strategies to pest pressure, environmental conditions, and hybrid-specific responses.

ACKNOWLEDGMENT

The paper is part of the Sectoral Research Plan ADER 2023–2026, specifically Project ADER 5.1.4., funded by the Ministry of Agriculture and Rural Development.

REFERENCES

Francis, F., Then C., Francis, A., Gbangbo, Y.A.C., Iannello, L., Ben Fekih I. 2022, Complementary strategies for biological control of aphids and related virus transmission in sugar beet to replace neonicotinoids*. Agriculture, 12*: 1663

Kereši, T. B., Sekulić, R. R., Čačić, N. J., Forgić, G. Đ., & Marić, V. R. 2006. Control of sugar beet pests at early season by seed treatment with insecticides. *Zbornik Matice Srpske za Prirodne Nauke, 110*, 195–204. https://doi.org/10.2298/ZMSPN0610195K

Konstantinov, A. S., Baselga, A., Grebennikov, V. V., Prena, J., Lingafelter, S. W. 2011. *Revision of the Palearctic Chaetocnema species (Coleoptera: Chrysomelidae: Galerucinae: Alticini).* Pensoft Series Faunistica, 95. Pensoft, Sofia–Moscow, 363 pp.

Lemić, D., Schumann, M., Tilcher, R., Czarnecki, O., Mikac, K. M., Vučemilović-Jurić, D., Viric Gašparić, H. 2024. Enhancing pest management in sugar beet cultivation: Impact of variety selection and insecticide seed treatments on sugar beet flea beetles and weevils. *Plant Protection Science, 60*(3), 278–287. https://doi.org/10.17221/8/2024-PPS

Scagliarini, O., Ferrari, R., Masetti, A., Burgio, G. 2023. Trap cropping: An agroecological approach to management of flea beetles on sugar beet. *Crop Protection, 166*, 106174. https://doi.org/10.1016/j.cropro.2022.106174

Viric Gašparić, H., Lemić, D., Drmić, Z., Čačija, M., Bažok, R. 2021. The efficacy of seed treatments on major sugar beet pests: Possible consequences of the recent neonicotinoid ban. *Agronomy, 11*(7), 1277. https://doi.org/10.3390/agronomy11071277

Yamane, T. Sugar beet. In *Encyclopedia Britannica*; Encyclopedia Britannica (UK) Ltd.: London, UK, 2016; Available online: https://www.britannica.com/plant/sugar-beet