

IMPACT OF WEED FLORA ON APHID AND THRIPS OCCURRENCE IN PEPPER (*CAPSICUM ANNUUM* L.) IN THE STRUMICA REGION

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ABSTRACT

This study was conducted during 2024 and 2025 in pepper fields at two localities in the Strumica region (Kuklish and Borievo) to determine weed species composition, their density, and their role as reservoirs of aphids and thrips. A total of ten weed species belonging to nine botanical families were identified in Kuklish and eight species in Borievo, in and around pepper fields. The most dominant species in both localities in 2024 were *Galinsoga parviflora*, *Chenopodium album*, and *Amaranthus retroflexus*. In 2025, the dominant species in Kuklish were *G. parviflora*, *C. album*, and *Cyperus rotundus*, while in Borievo they were *G. parviflora*, *C. album*, and *Capsella bursa-pastoris*. Weed density was higher in Kuklish compared to Borievo, reaching 81.6 and 62 plants m⁻² in 2024, and 83.4 and 70.8 plants m⁻² in 2025, respectively. Aphids and thrips were recorded on both weeds and pepper plants. The number of infected pepper plants varied during the growing season. In both years, infestation by aphids and thrips was higher in Kuklish than in Borievo. In both years and at both locations, thrips were more abundant than aphids. The results indicate a strong relationship between weed presence and pest occurrence, suggesting that weeds act as reservoirs for aphids and thrips. Effective weed management should therefore be considered an essential component of pest management strategies in pepper production.

Key words: weeds, *Galinsoga parviflora*, *Chenopodium album*, pepper, aphids, thrips, weed density.

INTRODUCTION

Weeds are an integral component of agroecosystems and have a significant impact on crop production. Traditionally, they are considered harmful due to their competition with crops for water, nutrients, and light. However, weeds also play an important ecological role, particularly as alternative hosts for various insect pests and plant pathogens (Altieri, 1999; Radosevich et al., 2007).

In vegetable production systems, pepper (*Capsicum annuum* L.) is one of the most economically important crops, especially in Strumica region in Republic of North Macedonia, but it is highly susceptible to infestation by insect pests such as aphids and thrips. These pests cause direct damage through feeding and indirectly by transmitting plant viruses, leading to significant yield and quality losses (Blackman & Eastop, 2000; van Emden & Harrington, 2007).

Many common weed species, including *Amaranthus retroflexus*, *Chenopodium album*, and *Galinsoga parviflora*, are known to host populations of aphids and thrips. These weeds enable pest survival during unfavorable conditions and facilitate their spread to cultivated crops (Lewis, 1997; Hillocks, 1998).

The presence of weeds in and around pepper fields can therefore influence pest population dynamics by serving as reservoirs and sources of infestation. This interaction between weeds and pests is of particular importance in the context of integrated pest management, where weed control is considered a key component in reducing pest pressure (Gaba et al., 2014).

Despite the recognized importance of weed-pest interactions, there is limited information on the role of weed flora as reservoirs of aphids and thrips in pepper production under local conditions in the Strumica region.

The aim of this study was to determine the composition and density of weed species and to assess their role as reservoirs of aphids and thrips in pepper fields.

MATERIAL AND METHODS

The research was conducted during 2024 and 2025 at two locations in Strumica region: Kuklish and Borievo. Weed species were identified and recorded using the square method (1 m² sampling area). The number of individuals of each species was counted to determine weed density (plants m⁻²). Simultaneously, the presence of aphids and thrips was monitored on both weeds and pepper plants. The number of infected pepper plants was recorded during several sampling periods throughout the growing season. Data were analyzed descriptively by calculating average values of weed density and the number of infected plants. Data were analyzed using descriptive statistics, and differences between localities were interpreted based on mean values.



Table 1. Weed density (plants m⁻²) in pepper fields (2024–2025)

Weed species	2024		2025	
	Kuklish	Borievo	Kuklish	Borievo
<i>Chenopodium album</i>	66	59	73	67
<i>Amaranthus retroflexus</i>	34	41	23	39
<i>Galinsoga parviflora</i>	90	81	96	88
<i>Capsella bursa-pastoris</i>	44	36	38	41
<i>Convolvulus arvensis</i>	20	15	18	21
<i>Portulaca oleraceae</i>	35	29	37	36
<i>Echinochloa crus-gali</i>	38	28	38	35
<i>Cyperus rotundus</i>	36	/	48	/
<i>Datura stramonium</i>	22	/	23	/
<i>Polygonum convolvulus</i>	23	21	23	27
Total	408	310	417	354

The results demonstrate the important role of weed flora as reservoirs of insect pests in pepper agroecosystems. Higher weed density and diversity in Kuklish were associated with increased pest infestation, supporting the hypothesis that weeds contribute to pest population dynamics. Thrips were the dominant pest group, particularly on weeds, indicating their strong adaptation to the local agroecological conditions. The significantly higher pest presence on weeds compared to pepper plants confirms their function as alternative hosts, facilitating pest persistence and spread.

RESULTS AND DISCUSSION

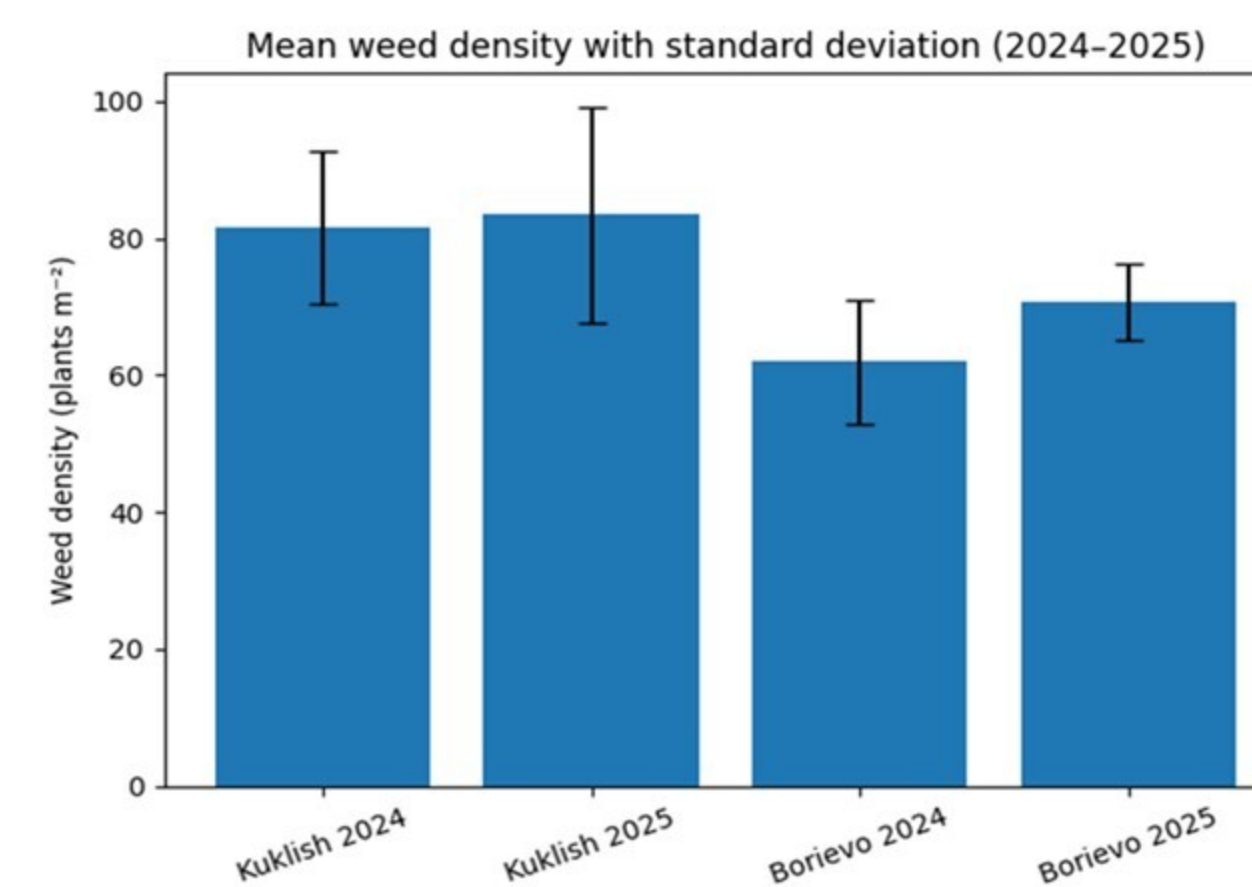


Figure 1. Mean weed density (plants m⁻²) with standard deviation in pepper fields (2024–2025)

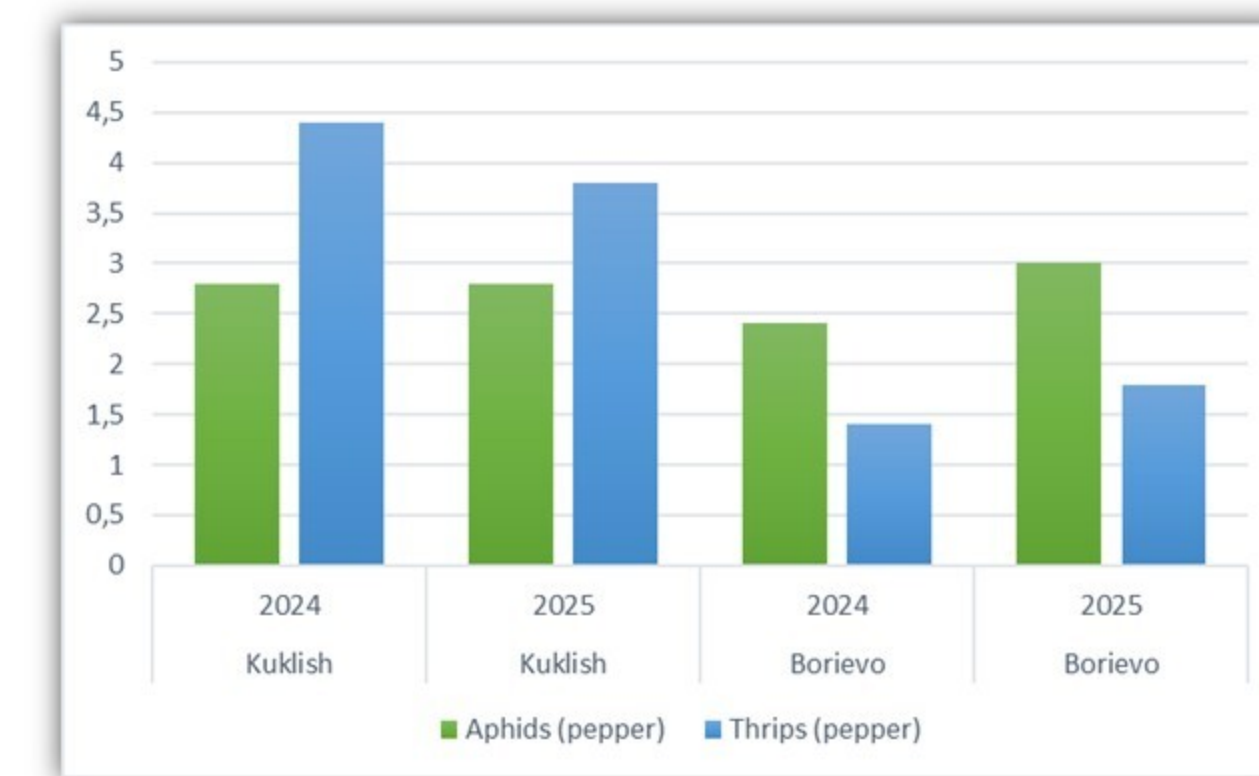


Figure 2. Aphids and thrips infestation on pepper plants

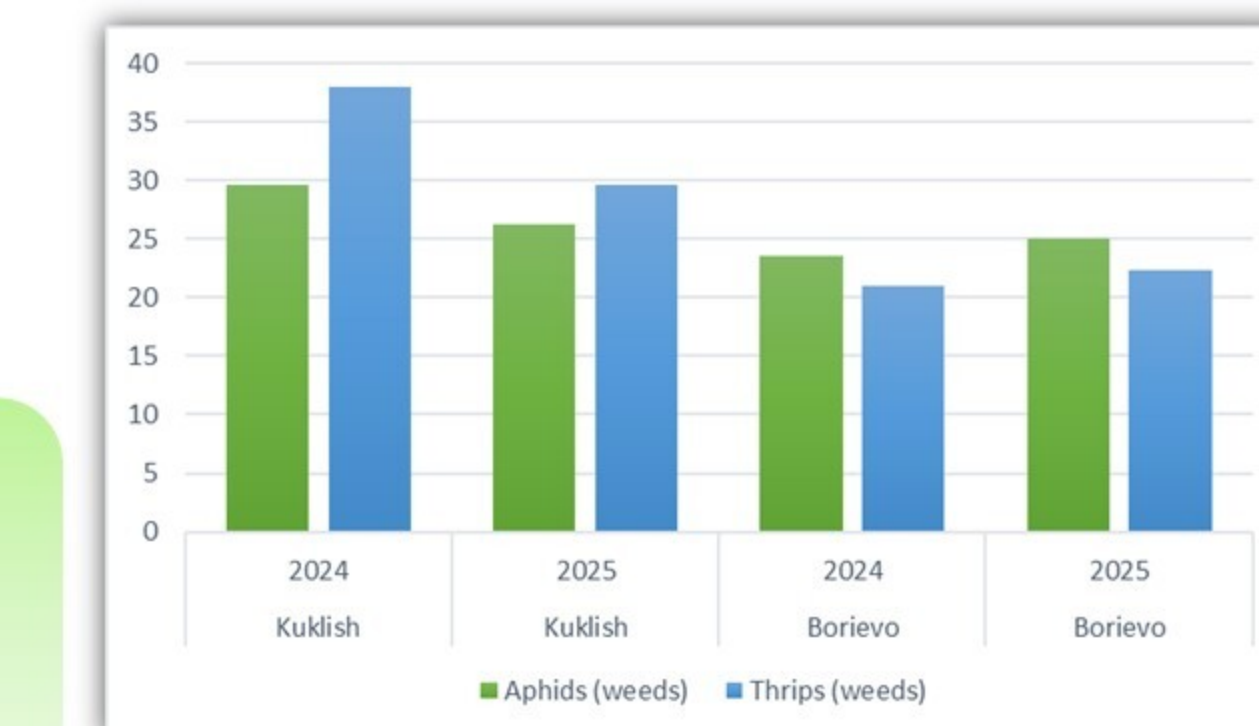


Figure 3. Aphids and thrips infestation on weeds

CONCLUSION

- ✓ The present study demonstrated that weed flora plays a significant role in the occurrence and distribution of aphids and thrips in pepper production systems.
- ✓ Higher weed density and diversity were associated with increased pest infestation, particularly in the locality of Kuklish. Thrips were found to be the dominant pest group, while weeds hosted significantly higher pest populations compared to pepper plants, confirming their role as reservoirs.
- ✓ These findings indicate that effective weed management is essential for reducing pest pressure and should be considered a key component of integrated pest management strategies in pepper production.
- ✓ Future studies should focus on quantifying the direct impact of specific weed species on pest population dynamics and crop yield.

