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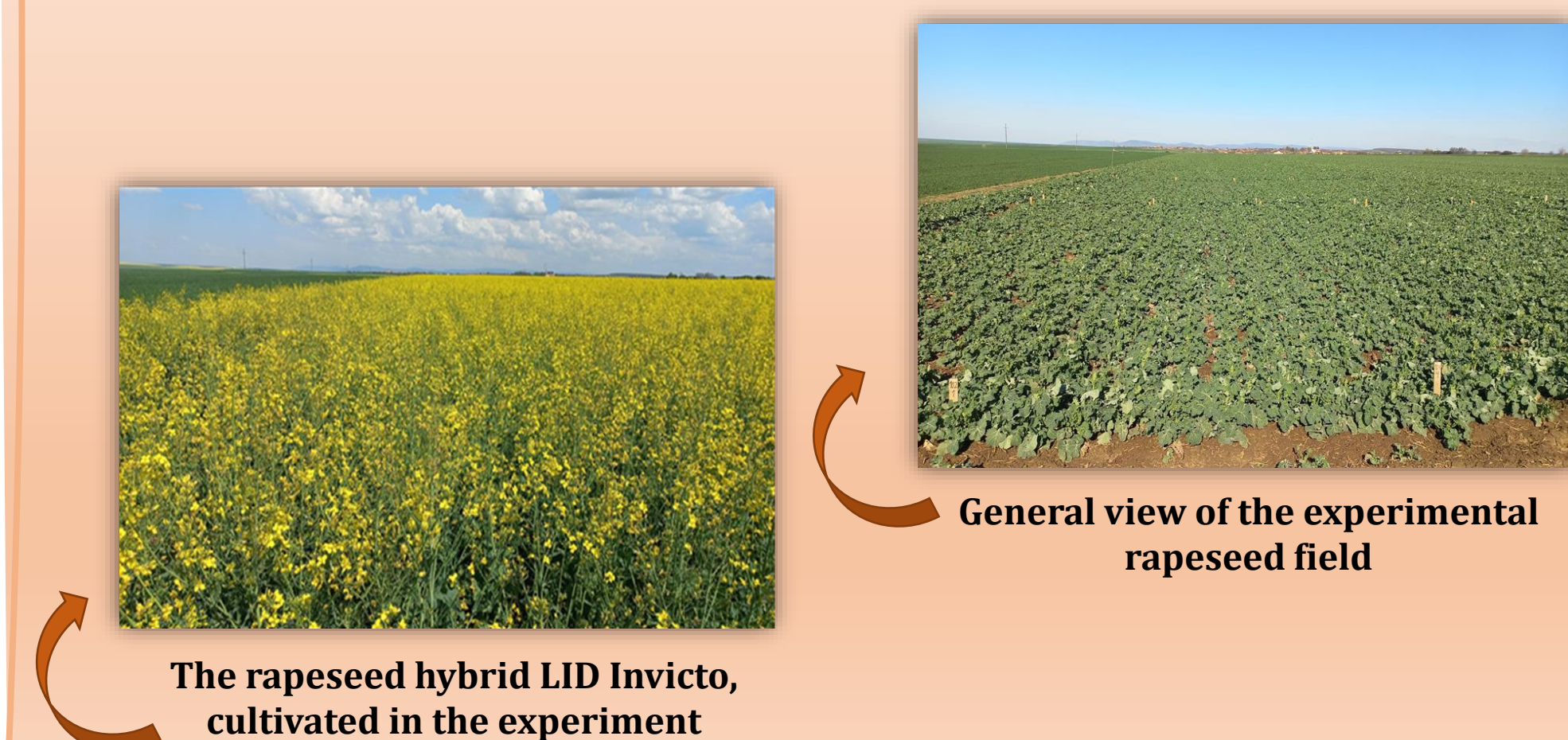
EFFECTIVE STRATEGIES TO MINIMIZE THE IMPACT OF WEED FLORA ON RAPESEED CROPS

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Abstract: Rapeseed (*Brassica napus* L.) plays a key role in the global economy as a major source of vegetable oil used for food, feed, and biofuel production. Beyond its industrial importance, rapeseed remains a highly profitable crop. The present study aimed to evaluate the efficacy of weed control in rapeseed cultivation using the pre-emergent herbicide Successor Pro (petoxamide 600 g/L) and the post-emergent herbicides Effigo S (240 g/L clopyralid + 80 g/L picloram + 40 g/L aminopyralid), Korvetto (5 g/L halauxifen-methyl + 120 g/L clopyralid), and Panarex 40 EC (40 g/L quizalofop-P-tefuryl + 75% ethametsulfuron-methyl), applied individually or in combination across nine experimental variants.

• Introduction

Rapeseed (*Brassica napus* L.) is one of the most important oil crops in Romania, but its productivity is strongly affected by weed infestation. The high competitiveness of the weed flora, especially during the early growth stages, can lead to significant yield losses. The experiment aimed to assess the structure of the segetal flora present in autumn rapeseed crops and to evaluate the effectiveness of several herbicide treatments, both individually and in combinations, in order to identify optimal solutions for integrated weed management.



• Material and method

The experiment was carried out in the agricultural years 2023–2025, using the rapeseed hybrid *LID Invicto*. A randomized block design with nine variants and four replications was used. Herbicide treatments were applied either pre-emergence or post-emergence, depending on the product. The tested herbicides included Successor Pro, Effigo S, Korvetto, and Panarex 40 EC, applied both individually and in combinations. The degree of weed infestation was determined through mapping before treatment, and the effectiveness of each herbicide was evaluated two weeks after application. Statistical analysis was used to interpret the differences between variants and the experimental mean.

Herbicide variants evaluated

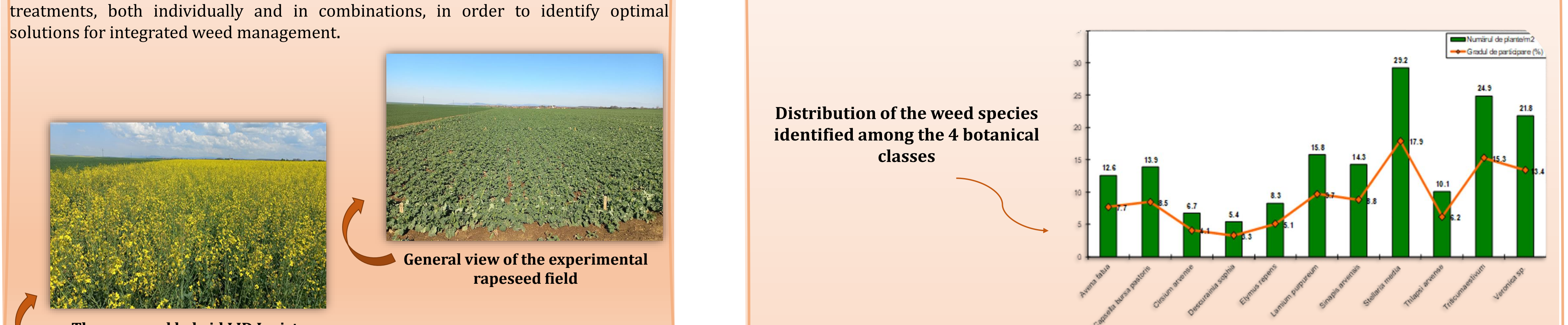
Variant	Herbicide (commercial product)	Active substance	Dose		Application timing
			Commercial product	Active substance/ha	
v1	Successor Pro	Petoxamid 600 g/l	2.0 l/ha	1200 g/ha	pre-em
v2	Effigo S	240 g/l clopyralid +80 g/l picloram + 40 g/l aminopyralid	0.25 l/ha	60 g/l clopyralid +20 g/l picloram+10 g/l aminopyralid	post-em (spring)
v3	Korvetto	5 g/l halauxifen-methyl + 120 g/l clopyralid	1.0 l/ha	5 g/l halauxifen-methyl + 120 g/l clopyralid	post-em (spring)
v4	Panarex 40 EC	40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron-methyl	1.0 l/ha	40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron-methyl	post-em (spring)
v5	Successor Pro + Effigo S	Petoxamid 600 g/l + 240 g/l clopyralid +80 g/l picloram + 40 g/l aminopyralid	2.0 l/ha+ 0.25 l/ha	1200 g/ha + 60 g/l clopyralid + 20 g/l picloram + 10 g/l aminopyralid	pre-em + postem (spring)
v6	Successor Pro + Korvetto	Petoxamid 600 g/l+5 g/l halauxifen-methyl + 120 g/l clopyralid	2.0 l/ha+ 1.0 l/ha	1200 g/ha + 5 g/l halauxifen-methyl + 120 g/l clopyralid	pre-em + postem (spring)
v7	Successor Pro + Panarex 40 EC	Petoxamid 600 g/l+ 40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron-methyl	2.0 l/ha+ 1.0 l/ha	1200 g/ha + 40 g/l quizalofop-P-tefuryl+ 75% ethametsulfuron-methyl	pre-em + postem (spring)
v8	Effigo S + Panarex 40 EC	240 g/l clopyralid + 80 g/l picloram + 40 g/l aminopyralid + 40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron-methyl	0.25 l/ha + 1.0 l/ha	60 g/l clopyralid + 20 g/l picloram + 10 g/l aminopyralid + 40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron methyl	post-em + post-em (spring)
v9	Korvetto+ Panarex 40 EC	5 g/l halauxifen-methyl + 120 g/l clopyralid + 40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron-methyl	1.0 l/ha+ 1.0 l/ha	5 g/l halauxifen-methyl + 120 g/l clopyralid + 40 g/l quizalofop-P-tefuryl + 75% ethametsulfuron methyl	post-em + post-em (spring)
v10	Control (untreated)	-	-	-	-

Conclusions → The rapeseed field was infested with 11 weed species, predominantly broadleaf types.

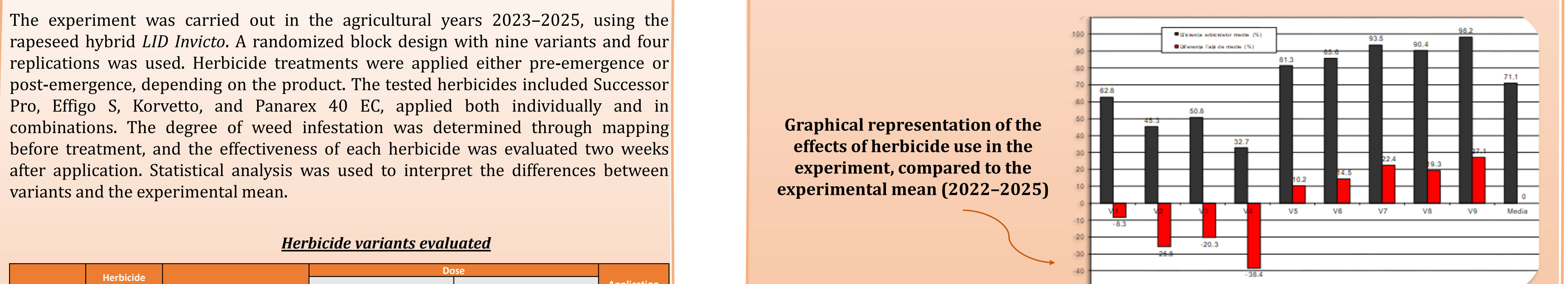
- Single herbicide applications were insufficient for effective control.
- Combining herbicides provided superior results and maintained excellent crop selectivity.
- The most efficient treatments were V7 (Successor Pro + Panarex 40 EC), V8 (Effigo S + Panarex 40 EC), and V9 (Korvetto + Panarex 40 EC).
- Effective weed control ensured both cleaner crops and higher rapeseed yields.

• Results and discussions

The initial weed mapping revealed a high infestation level, with 163 weed plants/m² belonging to 11 species from six botanical families. Broadleaf weeds predominated, especially *Lamium purpureum*, *Stellaria media*, and *Veronica sp.*, which together accounted for 41% of total infestation. Monocotyledonous species were represented by *Avena fatua* and volunteer wheat, while *Elymus repens* was the only perennial narrow-leaved weed.



Individually applied herbicides achieved modest weed control, ranging from 32.7% (Panarex 40 EC) to 62.8% (Successor Pro). In contrast, combinations of herbicides demonstrated synergistic effects, achieving significantly higher control levels, up to 98.2% in the Korvetto + Panarex 40 EC variant. These results confirm the importance of combining active ingredients with complementary selectivity spectra to effectively manage mixed weed populations.



Impact on Rapeseed Yield → The effectiveness of herbicide treatments was directly reflected in rapeseed yields. Plots treated with single herbicides produced lower yields than the experimental average (2979 kg/ha), while combinations of two herbicides significantly increased productivity. The highest yields were recorded in the Korvetto + Panarex 40 EC (3845 kg/ha), Successor Pro + Panarex 40 EC (3618 kg/ha), and Effigo S + Panarex 40 EC (3527 kg/ha) variants. These yield gains were statistically significant, demonstrating the economic relevance of effective weed control.

