



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM
TIMISOARA

"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH
IN APPLIED LIFE SCIENCES"



"Young people and multidisciplinary
research in applied life sciences"

16-17 November 2023

THE CONTROL OF *LAMIUM PURPUREUM* AND *RANUNCULUS REPENS* SPECIES IN THE PEAR ORCHARD

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Abstract: The purpose of this study was to reduce the populations of *Lamium purpureum* and *Ranunculus repens* by using the substances MCPA and Fluroxipir-methyl. The testing of herbicides in combating these two weed species (*Ranunculus repens* and *Lamium purpureum*) was conducted at the Pome and Experimental Station in Herindești, Lugoj (Timiș County). The experimental field consisted of 5 variants: three treated with the hormonal herbicide MCPA 50% DMA (0.9 l/ha, 1.2 l/ha, 1.5 l/ha), one treated with Cerlit herbicide (1.0 l/ha), and a control group. These herbicides were applied post-emergence (April 21, 2022). The impact of MCPA and fluroxipir substances on the control of *Ranunculus repens* and *Lamium purpureum* species was assessed at 10 to 38 days after application. At 10 days after treatment, the population of *Lamium purpureum* species was reduced by 70-75%, and regarding the species *Ranunculus repens*, it was observed that the product MCPA 50% DMA at 1.5 l/ha managed to reduce the population by 80%. At 38 days after application, an increase in the effectiveness of herbicides in controlling weed species was observed.

• Introduction

In the last 20 years, the area occupied by pear trees in Romania has been decreasing from 9,974 hectares to 3,218 hectares. Favorable conditions for pear cultivation can be found in 14 counties. Orchards are annually infested with weeds that compete with fruit trees for nutrients, space, water, light, and reduce growth, vigor, flowering, production, and fruit quality. Herbicides are an efficient, easy, and relatively inexpensive method for weed control. The effectiveness of herbicides against weeds varies for each species. Herbicide application is carried out using post-emergence (systemic) herbicides. When applying them, caution is required not only for economic and energy efficiency but also to avoid environmental pollution, soil contamination, and increased production. Many researchers have investigated weed control using herbicides (Rankova et al., 2006, 2009a, 2019; Hanson and Schneider, 2008; Rankova and Tityanov, 2013; Kyselová et al., 2019). Maintaining orchards weed-free for 12 weeks can lead to a 44% increase in total yield compared to treatments where weed control was not performed (MacRae et al., 2007). The effectiveness of herbicides and their combinations was higher when applied at the leaf emergence stage compared to other weed growth stages (Khokhar et al., 2005). Abouziena et al. (2008) reported a significant reduction in fruit production per tree due to weed infestation. Herbicide treatments result in higher yields.

• Material and method

The research was carried out within the Orchard and Experimental Facility - Lugoj Herindești. The experiment took place in the year 2022 and included 5 variants with 4 repetitions each. The substances used were MCPA 500 g/ha and Cerlit (Fluroxipir-meptil 250 g/ha), applied post-emergence during the crop's vegetation period. Herbicide application took place on April 21, 2022. The variants differed in terms of the active substance and the applied dosage. After herbicide application, observations were made regarding their effectiveness in combating dandelion and dead nettle, and the assessment was

	Commercial product	Active ingredient	Dose
1	Unhoed control	-	-
2	MCPA	500 g/l MCPA acid	1.5 l/ha
3	MCPA	500 g/l MCPA acid	1.2 l/ha
4	MCPA	500 g/l MCPA acid	0.9 l/ha
5.	Cerlit	Fluroxypyr 250g/l	1 l/ha



• Results and discussions

In the pear orchard, we identified the following weed species: *Stellaria media*, *Veronica hederifolia*, *Cirsium arvense*, *Cardaria draba*, *Convolvulus arvensis*, *Digitaria sanguinalis*, *Ranunculus repens*, *Lamium purpureum* and *Traxacum officinale*. The average number of weeds was 56.25 weeds/m². In the orchard, dicotyledons, both annual and perennial, dominated.

Chemical control of *Lamium purpureum* compared to the reference herbicide (at 10 days post-application)

Variant	Control (%)			Average	Diff. Abs.	Diff. rel.	Semn.
	I	II	III				
MCPA 1.5 l/ha	70	75	80	75	0.0	100	-
MCPA 1.2 l/ha	75	70	75	73.33	-1.67	97.78	-
MCPA 0.9 l/ha	70	70	70	70	-5.0	93.33	-
Cerlit 1.0 l/ha	80	70	75	75	0.0	100	-

Chemical control of *Ranunculus repens* compared to the reference herbicide (at 10 days post-application)

Variant	Control (%)			Average	Diff. Abs.	Diff. rel.	Semn.
	I	II	III				
MCPA 1.5 l/ha	85	80	80	81.67	106.52	5	-
MCPA 1.2 l/ha	70	80	85	78.33	102.17	1.67	-
MCPA 0.9 l/ha	75	80	80	78.33	102.17	1.67	-
Cerlit 1.0 l/ha	75	80	75	76.67	100	0	-

Chemical control of *Lamium purpureum* compared to the reference herbicide (at 38 days post-application)

Variant	Control(%)			Average	Diff abs.	Diff rel.	Semn.
	I	II	III				
MCPA 1.5 l/ha	85	85	80	83.33	106.38	5.00	*
MCPA 1.2 l/ha	75	80	80	78.33	100.00	0.00	-
MCPA 0.9 l/ha	80	75	75	76.67	97.87	-1.67	-
Cerlit 1.0 l/ha	80	80	75	78.33	100.00	0.00	-

Chemical control of *Ranunculus repens* compared to the reference herbicide (at 38 days post-application)

Variant	Control(%)			Average	Diff abs.	Diff rel.	Semn.
	I	II	III				
MCPA 1.5 l/ha	85	85	85	85.00	106.25	5.00	**
MCPA 1.2 l/ha	80	80	85	81.67	102.08	1.67	-
MCPA 0.9 l/ha	80	75	80	78.33	97.92	-1.67	-
Cerlit 1.0 l/ha	80	80	80	80.00	0.00	100.00	-

Conclusions

- Quantitative numeric mapping highlighted the presence of 9 weed species in the pear orchard, classified systematically into 8 botanical families.
- The target weeds (*Ranunculus repens* and *Lamium purpureum*) were dominant.
- The effectiveness of the herbicides used in the experiment was influenced by the treatment, dosage, and days post-application.
- MCPA herbicide 1.5 l/ha best controlled populations of ephemeral (*Lamium purpureum*) and perennial (*Ranunculus repens*) weeds. Statistical superiority was evident at 38 days post-application.
- At 10 days post-treatment, the effectiveness of herbicides against the two target weeds was lower compared to that recorded at 38 days.
- The application of the 0.9 l/ha MCPA dosage resulted in lower percentages compared to the reference product Cerlit.

The control efficiency of the species *Lamium purpureum* was significantly influenced by the applied treatments compared to the untreated control. The treatments used in the experiment reduced the population of *Lamium purpureum* by 70-75%. The herbicide MCPA, applied in three doses (1.5 l/ha, 1.2 l/ha, 0.9 l/ha), controlled the population of *Lamium purpureum* by 70-75%. The absolute differences of (-1.67) and (-5.0) did not show significance compared to the Cerlit herbicide (the reference product), being statistically equal. Throughout the year 2022, the maximum effectiveness in combating the species *Ranunculus repens* in the pear orchard was recorded in the plots where the herbicide MCPA at 1.5 l/ha was applied. At 10 days post-application, the reference herbicide, Cerlit at 1l/ha, controlled the least number of plants of the species *Ranunculus repens* (76.67%), although statistically, no differences were recorded. The second evaluation of the efficacy of MCPA and Cerlit in controlling *Lamium purpureum* and *Ranunculus repens* species was conducted at 38 days post-application (29.05.2022). *Lamium purpureum*, after 38 days from herbicide application, was reduced by 76.67% - 83.33%. The presented data show an increase in the efficacy of MCPA and Cerlit herbicides in combating *Lamium purpureum*. Compared to the reference product Cerlit at 1 l/ha, the MCPA herbicide at 1.5 l/ha significantly reduced the ephemeral species. By decreasing the herbicide dose (MCPA), no statistical differences were obtained compared to the reference herbicide. However, it should be noted that the application of 0.9 l/ha of MCPA led to a relative difference of 97.87%, making the efficacy lower than the untreated control. The perennial species *Ranunculus repens*, present in the pear orchard, was controlled by 78.33% - 85%, with highly significant efficiencies compared to the untreated control. The application of the dose of 1.5 l/ha of MCPA resulted in a higher herbicide residual effect, with maximum efficacy at 38 days post-application, and the percentages obtained were significantly different from the reference product. Doses of 1.2 l/ha and 0.9 l/ha led to absolute differences of (-1.67) and (1.67), but were statistically insignificant. The product Cerlit had an 80% effectiveness in controlling the perennial species *Ranunculus repens*.