

## RESEARCH REGARDING THE PROTECTION OF WHEAT CROPS AGAINST WEEDS ON A HISTOSOL FROM BERVENI COMMUNE, SATU MARE COUNTY

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**Abstract.** Romania is a specific country in terms of weeding. The results show that in 2010, out of the 14 million hectares officially designated for agriculture, the amount of biomass provided by weeds is about 1.21 times higher than the useful biomass. In the last thirty years there have been very few experiments in the country on weed control on different types of soil. The researches in Romania has shown that herbicide treatments should be done depending on soil type, clay content, humus and pH of the soil. Integrated Weed Management (IWM) is a complex notion that means the management of monitoring, knowing and mastering the relationships between weeds and crops through a variety of methods, including the balanced use of herbicides. The new concepts do not involve the elimination of herbicides but their use after the depletion of all alternative variants. This research aims to determine the herbicides or combinations of herbicides in rates with the best efficacy depending on each type of soil. The present paper presents the efficiency of herbicide treatments on wheat yield on a histosol from Bervenii, Satu Mare county and implicitly the control strategies. Satu Mare county has an area of 4,418 km<sup>2</sup> (1.9% of the national territory), agricultural land being 72% of this area.

**Keywords:** soil, weeds, wheat, herbicides, yield

### 1. Introduction

Despite all the progress made in agriculture in the last century, weeds are still present in cultivated lands. The technical and financial effort to reduce weed infestation is high, but it is justified through the higher level of yield and its quality. In the moment when the costs exceed the difference value of the obtained yield, weed control is no longer profitable.

The floristic composition of weeds has changed due to human intervention through the soil tillage, applied crop rotation, fertilization and herbicide treatments. Once entered the process of agricultural yield at the action of natural

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conditions is added the influence of man which is continuously accentuated, becoming at some point decisive on the weeding degree and floristic composition.

Numerous researches carried out in other countries and in our country have led to the conclusion that the fight against weeds cannot be achieved through single measures as it was considered at one time. Chemical weed control has been a major step forward and is still an effective, but not an exclusive measure. The most effective weapon is the application of a set of measures, including agro-phytotechnical ones, which include crop rotation with an important role. Soil fertility influences the infestation degree, the floristic composition of weeds and the potential yield of crops [4, 7].

The efficacy of weeds control in the field, requires a good knowledge of the pedoclimatic conditions that influence the efficiency of herbicide treatments applied preemergently or postemergently due to the different floristic composition depending on these conditions [2, 8, 9].

In order to achieve the desideratum, the researches were oriented towards the approach of some weed control strategies depending on the type of soil and the floristic composition of the weeds in the wheat crops [1,3].

### **The biological material used**

In a modern agriculture, in the integrated management of weeds, using the chemical method of control remains a link of great importance contributing to the increase of yields by reducing the competition of weeds. Wheat, in the structure of field holds the share in Romania.

The diversity of weed species and also the differentiation in terms of their capacity have led to the further study of new and more efficient herbicides.

In fact, worldwide, an important goal of research in the field of herbicides has been the creation of new substances, more efficient herbicides, with a low impact on the environment, using very low rates per hectare, which gives them easy handling [10, 11].

Chemical control of wheat weeds is a matter of national interest, due to the damage caused to Romanian agriculture. In the last years, a series of herbicides have entered to the Romanian pesticide market with very good results in control of weeds from wheat crops [5, 6].

The experiments were located on a histosol from Berveni, Satu-Mare county and aim to establish the influence of soil type on the floristic composition of weeds in wheat crops and the influence of weed on yield and quality of the yield. The objective was to find the best strategy for weed control from an economic point of view. This research was conducted over three years (2015, 2016, 2017).

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The biological material used in this research was Glosa wheat variety.

The Glosa wheat variety was obtained at INCDA Fundulea. It is an early variety, has good resistance to fallen, is resistant to wintering, drought and heat. It also has a good resistance to ear sprouting, having medium resistance to brown rust, while it has good resistance to powdery mildew.

The dominant weed species existing in the wheat crop on the Berveni histosol are presented in (Table 1 and Figure 1)

**Table 1.** The dominant weed species existing in the wheat crop on the Berveni histosol

<i>Scientific name</i>	<i>Popular name</i>	<i>Density pl/sm</i>
<i>Papaver rhoeas</i>	Mac roșu	72
<i>Adonis aestivalis</i>	Cocoșei de câmp	2
<i>Viola arvensis</i>	Trei frați pătați	2
<i>Convolvulus arvensis</i>	Volbură, Rochița rândunicii	1
<b>TOTAL</b>		<b>77</b>



**Fig. 1.** Untreated wheat crop with herbicides on the histosol from Berveni (Original)

The herbicides applied to the autumn wheat crop are presented in Table 2.

**Table 2.** Herbicides applied to autumn wheat crop on the histosol from Livada and Berveni

No Var.	Herbicide	Rates l, kg/ha	Active substance
1	Rival 75GD	0.015	Clorsulfuron 75%
2	Rival+Hudson	0.010+1.0	Clorsulfuron 75% + fluoxipir 200g/l
3	Dicopur D	1.0	Acid 2.4 D of dimetilamine salt 600g/l
4	Rival Star 75GD	0.015	Tribenuron-metil 75%
5	Rival Star 75GD	0.020	Tribenuron-metil 75%
6	Axial One	1.0	Pinoxaden 45g/l+florasulam 5g/l+safener
7	Axial One	2.0	Pinoxaden 45g/l+florasulam 5g/l+safener
8	Lancelot Super	0.033	Aminopiraliid 30% + florasulam 15%
9	Pallas 75 WG+Adjuvant	0.110+0.5	Piroxsulam 7.5% + safener
10	Attribut	0.060	Propoxicarbazon-sodiu 700g/kg
11	Floramix+Adjuvant	0.120+0.6	Piroxsulam70.8g/kg+florasulam14.2g/kg+ safener
12	Floramix+Adjuvant	0.260+0.6	Piroxsulam70.8g/kg+florasulam14.2g/kg+ safener
13	Rival Super Star	0.020	Tribenuron-metil 37.5% + clorsulfuron 37.5%
14	Pelican Delta	0.100	Metsulfuron 6g/kg +diflufenican 600g/kg
15	Pallas 75 WG+ Adjuvant	0.250+0.5	Piroxsulam 7.5% + safener
16	Sekator Progres OD	0.15	Iodosulfuron metil25g/l+amidosulfuron100g/l+safener
17	Dicopur Top 464 SL	1.0	Acid 2.4 D of DMA salt 344g/l+dicamba 120g/l
18	Untreated	-	-

High competition between weeds and wheat plants have a big influence on wheat yield. The highest yield and gain was registered by the variants V2, V4 and V7 (Table 3).

Table 4 shows the value of yield gain and herbicide costs compared to untreated variant in wheat crop, during 2015-2017. The highest profit was recorded by the variants V2, V4 and V10.

Table 5 shows the efficacy of herbicide treatments in wheat crop on histosol from Berveni, years average 2015-2017. The highest efficacy was noticed in case of the variants: V2, V4, V7 and V10.

The infestation degree on the histosol is high, being determined by the higher number of specimens of *Papaver rhoaes* and *Adonis aestivalis*.

**Table 3.** The influence of herbicide treatments on wheat crop yield from the histosol during 2015-2017

<i>No.Var.</i>	<i>Yield q/ha</i>	<i>Difference +/- against untreated variant</i>
1	81.36	28.03
2	<b>92.50</b>	<b>39.17</b>
3	79.96	26.63
4	<b>90.43</b>	<b>37.10</b>
5	85.26	31.93
6	84.03	30.70
7	<b>88.43</b>	<b>35.10</b>
8	83.40	30.07
9	85.53	32.20
10	88.20	34.87
11	86.33	33.00
12	81.40	28.07
13	82.73	29.40
14	83.76	30.43
15	79.06	25.73
16	81.76	28.43
17	80.30	26.97
18	53.33	-

**Table 4.** The value of yield gain and herbicides costs compared with untreated variant in wheat crop during 2015-2017

<i>No. Var.</i>	<i>Costs with herbicides Ron/ha</i>	<i>Histosol</i>	
		<i>Value of yield gain Ron/ha</i>	<i>Profit/Loss Ron/ha</i>
1	33.75	1,401.50	1,367.75
2	112.50	1,958.50	<b>1,846.00</b>
3	28.00	1,331.50	1,303.50
4	31.50	1,855.00	<b>1,823.50</b>
5	42.00	1,596.50	1,554.50
6	258.20	1,535.00	1,276.80
7	516.40	1,755.00	1,238.60
8	57.00	1,503.50	1,446.50
9	122.46	1,610.00	1,487.54
10	107.40	1,743.50	<b>1,636.10</b>
11	146.66	1,650.00	1,503.34
12	308.39	1,403.50	1,095.11
13	43.00	1,470.00	1,427.00
14	64.85	1,521.50	1,456.65
15	268.06	1,286.50	1,018.44
16	72.15	1,421.50	1,349.35
17	53.00	1,348.50	1,295.50
18	-	-	-

\*Value of yield gain was calculated at 0.50 Ron/kg

**Table 5.** The efficiency of herbicide treatments on wheat crops on the Berveni histosol during 2015-2017

No. Var.	Herbicides	Rate l, kg/ha	Application time	Selectivity Note EWRS	Efficacy %
1	Rival 75GD	0.015	Post	1	84
2	Rival 75GD +Hudson	0.010+1.0	Post	1	<b>91</b>
3	Dicopur D	1.0	Post	1	80
4	Rival Star 75GD	0.015	Post	1	<b>91</b>
5	Rival Star 75GD	0.020	Post	1	86
6	Axial One	1.0	Post	1	84
7	Axial One	2.0	Post	1	<b>87</b>
8	Lancelot Super	0.033	Post	1	83
9	Pallas 75 WG+Adj.	0.110+0.5	Post	1	83
10	Attribut	0.060	Post	1	<b>87</b>
11	Floramix+Adjuvant	0.120+0.6	Post	1	85
12	Floramix+Adjuvant	0.260+0.6	Post	1	82
13	Rival Super Star	0.020	Post	1	83
14	Pelican Delta	0.100	Post	1	85
15	Pallas 75 WG+ Adj	0.250+0.5	Post	1	80
16	Sekator Progres OD	0.15	Post	1	84
17	Dicopur Top 464 SL	1.0	Post	1	75
18	Untreated	-	-	-	28

## Conclusions

(1). These researches aimed to establish the technical and economic efficiency of herbicide treatments for wheat crop on the histosol from Berveni, Satu-Mare county, in the current climatic conditions and applied technologies.

(2). The researches were carried out in 2015, 2016, 2017 on a histosol with a pH of 5.1, the organic matter content was 86% being a soil rich in nutrients, the crop plant being wheat, the experiments were placed according to the rectangular Latin method, 18 variants in three repetitions, the surface of the plot being 21 sm.

(3). The highest yields were obtained in variant 2 (92.50 q / ha, the difference being 39.17 compared to untreated variant; variant 4 (90.43 q / ha, the difference being 37.10 compared to untreated variant) and in variant 7 (88.43 q / ha, the difference being 35.19).

(4). Analyzing the profit on histosol resulted that the most profitable variants were the variants (2,4,10) treated with Rival 75 GD 10g / ha + Hudson 1l / ha, Rival Star 75 GD 15g / ha followed by the variant treated with Attribute 60g / Ha.

(5). Regarding the efficacy of herbicide treatments on histosol it was established that the best weed control was registered in the variants treated with Rival 10g / ha + Hudson 1l / ha, Rival Star 75 GD 15g / ha and Axial One 2l / ha.

(6). The results obtained provide farmers and not only, information regarding the influence of soil type on the floristic composition of weeds and the infestation degree in wheat crops.

(7). Based on these results, farmers have the opportunity to establish the most effective and efficient methods of weed control in winter wheat crop.

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