

CONTROLLING THE PERENNIAL SPECIES *RUBUS CAESIUS* L.: A PROBLEM-WEED IN GRAIN MAIZE IN THE BANAT AREA

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ABSTRACT: Controlling the Perennial Species *Rubus caesius* L.: a Problem-Weed in Grain Maize in the Banat Area

The present paper aimed at determining the efficacy of controlling the perennial dicotyledonous weeds in general and the species *Rubus caesius* L., popularly called „blackberry” in the grain maize crops, using a wide range of post-emergent herbicide and pre-emergent herbicide acetochloride. The materials and methods used in controlling the problem weeds are described, evaluating the degree of control in percentage of dicotyledonous weeds in general and of the species *Rubus caesius* L. particularly and the grain maize production in q/ha on non-herbicide-treated variants and on those herbicide-treated in the agricultural year 2010. The results of the research on the total number of weeds/m² were presented in the non-herbicide-treated variant of the corn culture and the occurrence percentage. In the corn culture, in the agricultural year 2010 a number of 11 species were noticed, with the total number on m² of 246. The blackberry was present in the corn culture in a number of 21.2 weeds/m² with 8.61% occurrence. The most efficient reduction of blackberry sprouts, in corn culture, in the year 2010, was obtained with the herbicide Dialen Super 464 (0.9l/ha) , with a control degree of 96.97 %. The greatest corn crops obtained were registered in the variants herbicide-treated with Dialen Super 464 SL (0.9l/ha), Ceredin Super (1l/ha) and Bucril Universal (1l/ha), with productions of 68.14 q/ha, 67.46q/ha and respectively 65.68q/ha. The Mustang herbicide had no visible effect in controlling dewberry, therefore we do not recommend it for cornfields weed-grown with this species.

KEYWORDS: herbicide, *Rubus caesius* L, weed, wheat, control

INTRODUCTION

At present, corn occupies the 3rd place, as importance, among the plants grown in the world and has the most significant share within the structure of agricultural crops in Romania. However, the average production obtained is situated much under the biological potential of grown hybrides. One of the causes of this situation is the pronounced degree of weed-growth in this crop and the high sensitivity of corn in the presence of weeds, especially in the first 5-6 weeks after sowing.

Generally, the corn cultivated fields present high infestation with annual and perennial mono and dicotyledonous weeds, very different depending on the specific climatic and soil conditions, but also on the farm practices employed over time on the respective lands. In the field of weed control, the priority objective is represented by the limitation, on the whole period of vegetation, of weeds competition, by reduction of weed-growth under the level of economic threshold of pest.(NAGY et al., 2002)

Over time, in the strategy of weeds control in corn crops, significant progress has been recorded, especially due to synthesizing and employment of new herbicides. In our country, this strategy is currently based on two treatments: the first- pre-emergent (before or immediately after sowing) for controlling annual mono- and dicotyledonous weeds and the second- post-emergent (in vegetation) for controlling the perennial mono- and/or dicotyledonous species (MANEA., 2006).

Along with wheat and barley, corn represents the basic food for the most part of global population, directly or transformed in animal products.

Of 100 g grains one can obtain: 77 kilos of wheat or 63 kilos of starch, 44 l alcohol, 71 kilos of glucose, 1.8-2.7 l of oil and 3.6 kilos of cake. The grains contain on average 13.5% water, 10.0% proteins, 70.7% carbohydrates, 4% fats, 1.4% minerals, 0.4% acidic organic substances. (DAVID G., 2003).

The aim of the present paper is to evaluate the control of perennial dicotyledonous weeds, among which *Rubus caesius* L. popularly called blackberry, is more prominent. The studies that constitute the object of this paper had the main purpose to establish the most efficient modern means of chemical control of perennial dicotyledonous weeds and in general of the problem species *Rubus caesius* L. crops of grain corn, with direct effects on production results.

One of the most important links of corn crops is represented by weed control, especially of those considered problem species (LĂZURENU ET AL., 2002).

The present paper aimed at assessing the weed control, among which *Rubus caesius* L. popularly called blackberry, is more prominent. The research that constitute the object of the present paper had the main purpose to establish the most efficient modern means of chemical control of the problem species *Rubus caesius* L. in the crops of grain maize, with direct effects on production results.

Certain relations are established among weeds, type of soil, preceding plant, climate, ground water, level of farm practices, determining, by their influence, the level and quality of agricultural crops (CHIRILĂ ET AL., 2001).

One of the problem weeds in the wheat crop is the weed *Rubus caesius* L. (fam. *Rosaceae*), species with great variability (BERCA ET AL., 2004). It is a dicotyledonous perennial weed, semi ligneous, polycarpic, with mostly vegetative breeding from the sprouts on the roots and on crawling stems and less by seeds (COUSENS, CROFT, 2000). The crawling branches of stems lie on the ground and in this contact the layering is done. The branches have weak and unequal thorns. The plant spreads rapidly in the field and is highly resistant to control proceedings as it ratoons immediately of the vegetative organs left in the ground. Over time, in the strategy of weed control in corn crops, significant progress has been recorded, especially due to synthesizing and employment of new herbicides (HELDT, 2000).

The research that constitute the object of the present paper had the main purpose to establish the most efficient modern means of chemical control of the problem species *Rubus caesius* L. in the crops of grain maize, with direct effects on production results.

MATERIALS AND METHOD

The studies were performed in the agricultural year 2010 on the experimental field in the area of the village Sacoșu- Turcesc in Timiș County, being tested the effect of 9 post-emergent herbicides on blackberry control in the grain corn crops.

The corn hybrid used in this experiment was created by the firm Monsanto, a semi tardy corn hybrid approved in 2005, recommended for crops especially in Campia de Vest (the Western Field), in the south and south-east of the country, where good results were recorded. With a wide genetic basis, it displays high ecologic mouldability, achieving great and steady productions (11-14 t/ha), even in peculiar climatic conditions.

Considering the corn is weed-grown every year with a great number of monocotyledonous weeds and for a more accurate evaluation of the effect of post-

emergent herbicides on *Rubus caesius* L. plants, the pre-emergent herbicide Guardian was employed before corn springs.

In order to establish the efficacy of herbicides in dewberry control in corn crop, a monofactorial experience was set up on the field, by the method of randomized blocks, in four repetitions, each harvestable variant with 42 m², with the total surface of 1848 m².

Weed mappings were performed (by the method of numerical quantity) in order to determine the initial degree of weed-growth in the control variant and subsequently, in 20 days after applying herbicides into the vegetation to evaluate the results obtained in total control of weeds and especially of dewberry. On the whole vegetation of corn, after applying the herbicides, observations were made regarding the selectivity of the products tested on corn plants.

The post-emergent herbicides were administered in the vegetation when the blackberry had a stature of 10-15 cm, with the corn in the stage of 3-5 leaves.

The experimental variants were the following:

*V*₁-non-herbiced

*V*₂-Buctril Universal (Bromoxinil 280 g/l + acid 2,4D (ester) 280 g/l) -1l/ha

*V*₃-SDMA Super (Acid 2,4 -D 600 g/l) -1l/ha

*V*₄-Dialen super (Dicamba 120 g/l + 2,4 D 344g/l) -0,9l/ha

*V*₅-Kelvin top (40 g/l nicosulfuron)- 1l/ha

*V*₆- Mustang (Florasulam: 6,25gr/l + Acid 2,4D: 300gr/l) – 0,5l/ha.

*V*₇- Ceredin Super (300 g/l acid 2,4 -D+100g/l dicamba)-1l/ha

*V*₈-Merlin Duo (Isoxaflutol 37,5 g/l + terbutilazin 375 g/l)-2l/ha

*V*₉- Banvel 480 S(Dicamba 480 g/l)-0,6l/ha

*V*₁₀-Cambio (Bentazon 320 g/l + dicamba 90 g/l)- 2-2,25l/h.

The following were evaluated:

- The degree of control of the species *Rubus caesius* L. in % (the readings were made 15 days after herbiciding and the marks were given according to the scale EWRS regarding the control of weeds in wheat crops).
- The production of grain corn in 100kg/ha on non-herbiced variants and on herbiced ones.

RESULTS AND DISCUSSIONS

In table 1. are presented the species of weeds and the percentage of occurrence on the non-herbiced variant, in the grain corn crop.

The presented results show that in 2010, in the control variant a number of 246.0 weeds/m² were registered in corn, of which 21.2 plants/m² are represented by *Rubus caesius* L., with a percentage of participation of 8.61 % .

The dicotyledonous annual species as: *Hibiscus trionum*, *Chenopodium album*, *Amaranthus retroflexus*, *Polygonum convolvulus* had a share of 33.58 %, while dicotyledonous perennial species as: *Rubus caesius* L., *Convolvulus arvensis*, *Cirsium arvens*, represented 13.56%. In terms of the number of weeds on square meter, monocotyledonous weeds were in number of 137.3 weeds/m², and the dicotyledonous ones in number of 108.7 weeds/m². As compared to the number of weeds in the non-herbicide-treated variant of 246.00 weeds/m², following the treatments applied, the number of weeds was reduced with 136.8 weeds/m² in the variant herbicide-treated with SDMA Super (1l/ha), up to 237,3 weeds/m² in the variant herbicide-treated with Dialen Super 464 SL (0.9l/ha), in the corn crop.

Table 1: The number of weeds and the percentage of participation on species in non-herbicide variant in corn crop in the year 2010.

Nr.	Weed species	Number of weeds/m ²	% share	Botanical class
1.	<i>Setaria glauca</i>	75.5	30.69	A.m.
2.	<i>Sorghum halepense</i>	36.2	14.71	P.m.
3.	<i>Chenopodium album</i>	29.0	11.78	A.d.
4.	<i>Amaranthus retroflexus</i>	27.3	11.09	A.d.
5.	<i>Echinochloa crus-gali</i>	23.2	9.43	A.m.
6.	<i>Rubus caesius</i> L.	21.2	8.61	P.d.
7.	<i>Hibiscus trionum</i>	11.6	4.71	A.d.
8.	<i>Cirsium arvense</i>	9.1	3.69	P.d.
9.	<i>Polygonum convolvulus</i>	7.4	3.00	A.d.
10.	<i>Convolvulus arvensis</i>	3.1	1.26	P.d.
11.	<i>Cynodon dactylon</i>	2.4	0.97	P.m.
	Total	246.0	100	-

A.d. = annual dicots; P.d. = perennial dicots; A.m. = annual monocots; P.m. = perennial monocots

For corn, the total percentage of control is situated between 55.60% in variants herbicide-treated with SDMA Super (11/ha) and 96.46% in variants herbicide-treated with Dialen Super 464 SL (0.9l/ha) (table 2). As for the exclusive control of the species *Rubus caesius* L. in corn crop, best results were recorded in the variants herbicide-treated with Dialen Super 464 SL, 96.97%.

Table 2: The reduction of weed number in corn crops in the agricultural year 2010

Herbicide	Rate	Weed control EWRS grades	Number of weeds controlled	Control percentage		Significance of the difference
				Total	<i>Rubus caesius</i> L.	
<i>V₄-Dialen Super 464 SL</i>	0,9l/ha	3	237.3	96.46	96.97	***
<i>V₉-Banvel 480 S</i>	0,6l/ha	4	233.4	94.87	81.65	***
<i>V₇-Ceredin Super</i>	1l/ha	4	231.2	93.98	93.52	***
<i>V₂-Buctril Universal</i>	1l/ha	5	220.0	89.43	92.60	***
<i>V₈-Merlin Duo</i>	2l/ha	5	218.4	88.78	52.31	***
<i>V₁₀-Cambio</i>	2,5l/ha	5	212.6	86.42	75.67	***
<i>V₅-Kelvin top</i>	1l/ha	6	192.7	78.33	55.73	***
<i>V₆-Mustang</i>	0,5/ha	6	186.3	75.73	51.50	***
<i>V₃-SDMA Super</i>	1l/ha	7	136.8	55.60	67.12	***
<i>V₁- control (not treated)</i>	-	9	Mt	0.00	0.00	-

DL_{5%}=2.68 bur./m² DL_{1%}=4.24 bur./m² DL_{0.1%}=6.48 bur./m²

Significance: *** - very significant positive

The data in table 3 show that the greatest corn crops achieved were recorded in the variants herbicide-treated with Dialen Super 464 SL (0.9l/ha), Ceredin Super (1l/ha) and Buctril Universal (1l/ha), the productions being of 68.14 q/ha, 67.46q/ha and respectively 65.68q/ha, the differences to the field average being significantly positive. Significantly positive difference to the field average was recorded also in the variant herbicide-treated with Banvel (0.6l/ha).

Table 3: The experimental results regarding the average production in corn crops in 2010

Herbicide	Rate	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance of the difference
<i>V₄-Dialen Super 464 SL</i>	0,9/ha	68.14	134.79	+17.59	XXX
<i>V₇- Ceredin Super</i>	11/ha	67.46	133.45	+16.91	XXX
<i>V₂-Buctril Universal</i>	11/ha	65.68	129.93	+15.13	XXX
<i>V₉- Banvel 480 S</i>	0,61/ha	57.56	113.86	+7.01	X
<i>v₁₀- Cambio</i>	2,51/ha	52.71	103.99	+2.16	-
<i>Media</i>	-	50.55	100.0	<i>Mt</i>	-
<i>V₃-SDMA Super</i>	11/ha	45.22	89.45	-5.33	-
<i>V₈- Merlin Duo</i>	21/ha	42.82	84.70	-7.73	00
<i>V₆- Mustang</i>	0,51/ha	36.86	72.91	-13.69	000
<i>V₁- control (not treated)</i>	-	18.58	36.75	-31.97	000

DL 5%= 4.73

DL 1%= 7.35

DL 0.1%=11.40

Significance: xxx - very significant positive;

xx - significant distinct positive;

0 - significant negative;

000 - very significant negative.

The productions in which the difference to the field average was insignificant were achieved on the variants herbicide-treated with Cambio (2.51/ha) and SDMA Super (11/ha). The variants treated with Merlin Duo (21/ha) and Mustang (0.51/ha), ensured more reduced crops, as compared to the field average.

The lowest production was recorded on the non-herbicide treated variant (control), where the production was of 18.58 q/ha, with a highly significantly negative difference to the field average.

CONCLUSIONS

1. *Rubus caesius L.* is a problem weed in grain maize culture and presents great variability.
2. The soil, cambic chernozem, on which the experiments were performed presents good fertility, however offering, at the same time, favourable conditions for the growth and spreading of dewberry;
3. In the corn culture first were identified a total number of weeds of 246.0/m² in the control variant, of which *Rubus caesius L.* had a share of 8.61%, that is 21.2 plants/m².
4. The most efficient reduction of blackberry sprouts, in 2010, was achieved with the herbicide Super 464 SL, with a control degree of 96.97%. A control of over 90 % was registered also in the variants treated with Ceredin Super (93.52%) and Buctril Universal (92.60%).
5. The Mustang herbicide had no visible effect in controlling dewberry, therefore we do not recommend it for fields weed-grown with this species.
6. In all herbicide treated variants, after 30 days, but more noticeably after 60 days, the *Rubus caesius L.* plants had the tendency of regenerating, releasing new sprouts, however no longer able to create real competition for corn plants almost reaching maturity;

7. All tested herbicides were highly selective for the variety of corn cultivated, presenting no visible signs of phytotoxicity;
8. The corn productions obtained in the experimental field were influenced, on one hand by the climate conditions, and, on the other hand, were positively correlated with the performances of herbicides in controlling total weed-growth and that with blackberry.

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