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CONTROLLING THE PERENNIAL SPECIES *CONVOLVULUS ARVENSIS L.*: A PROBLEM-WEED IN WINTER WHEAT THE BANAT AREA

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ABSTRACT - Controlling the Perennial Species *Convolvulus arvensis* L. – A problem weed in winter wheat the Banat area
In the first part of the paper are presented aspects regarding the control of weeds in wheat crops, among which *Convolvulus arvensis* L. is more prominent, a problem species popularly called bindweed (CIOCÂRLAN et al., 2004). In the second part are described the materials and methods used to control problem weeds by which were evaluated the degree of control of the species *Convolvulus arvensis* L. in % and the wheat crops in q/ha on non-herbicide-treated variants and on those herbicide-treated. In the chapter called Results and discussions are presented the results of the research regarding the total number of weeds/m^2 in the non-herbicide-treated variant in wheat crops and the occurrence percentage. In wheat crops 12 species of weeds were recorded, with a total number of 58 on m^2 and a occurrence percentage of 100%. The bindweed was present in wheat crops in a number of 11.33 weeds / m^2 with an occurrence of 19.53 %. The last part of the paper includes the conclusions, where one can notice that the most efficient bindweed sprouts reduction, in the year 2010, was obtained with the herbicide Dicamba 120gr/l + 344gr/l acid 2.4D – 0.9l/ha., with a control degree of 90.90 %. A control of over 70 % was registered also in the variants treated with Bomoxinil: 280gr/l + Acid 2.4D: 280gr/l – 1l/ha and 300 g/l acid 2.4 –D + 100 g/l dicamba – 1 l/ha.

KEYWORDS: field bindweed, weed, herbicide, winter wheat.

INTRODUCTION

Wheat is one of the most important food plants, grown in over 45 countries, originated from south-west Asia. Its main use is for bread production and other varied flour derived products. In many countries wheat is used also in animal food presenting the following advantages over corn:

- is richer in proteic substances with nutritive value superior to that in corn due to the balance between amino acids and the absence of zein;
- higher vitamin content;
- the wheat crops are comparable to the corn ones;
- the cost of wheat is lower as compared to corn, being a completely mechanized crop;
- in irrigation conditions, after wheat a second crop can be obtained;
- due to the resistance to less favorable environmental factors,
- wheat crop area is higher than corn crop area (IKERD, 1993).

The wheat crop is not as difficult as the rice one, the cultivated fields do not require special land improvement or toilsome preservation proceedings. Between sowing and reaping, the field labors are relatively reduced. Once harvested, unlike rice, wheat does not require special proceedings (decortication) (MANEA,2006). The great importance of wheat, as well as its distribution in over 100 countries in the world

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prompted numerous studies over time and all over the world. One of the most important links of wheat crops is represented by weed control, especially of those considered problem species (SCHALLER NEILL, 1993).

The present paper aims at controlling weeds, among which *Convolvulus arvensis* L., popularly called bindweed, is more prominent (BERCA, 2004). The studies that constitute the object of this paper had the main purpose of establishing the most efficient modern means of chemical control of the problem species *Convolvulus arvensis* L. in the autumn wheat crops, with direct effects on production results.

Convolvulus arvensis L. is a native species from Europe and Asia, part of the *Convulvulaceae* family (NAGY ET AL., 2002; CIOCÂRLAN ET AL., 2004). The *Convolvulaceae* family contains plants with voluble, grassy stems or wooden lianas, often with tuberized roots. The simple leaves, whole, or lobate, with no stipels, are disposed alternatively. The solitary flowers or grouped in cymose or racemous inflorescence are bisexual, actinoform, on 5 type. The perianth is made up of 5 free or united sepals and the corolla of 5 united petals. The androecium has 5 stamens inserted on the corolla, with intrastaminal nectariferous. The syncarp superior gynaeceum comes from 2-5 carpels. The fruit is capsule (ŞARPE ET AL., 1998). It was introduced in North America, where, in patches, is an invasive species. The beds formed invade the cultures and reduce the crops; one can estimate that the damage caused by this plant exceed in USA 377 million dollars only in 1998 (BERCA, 2004).

Although it produces attractive flowers, it is often considered a weed because of its fast growth and stifling of the cultivated plants. In our county it is to be found everywhere, on all grounds, but especially on warm and drier soil, light and depth permeable, on the edge of roads, vegetable gardens, where it stifles young seedlings, in nurseries and plantations, where it hangs on bushes. In ornamental gardens it hangs on roses and other decorative plants. In thinned grassy fields it hangs on *Graminaceae*, obstructing their growth (BONJEAN AND ANGUS, 2001). It is a mesophyll plant drought resistant, due to its deep root system, but it does not bear the frost. It is a very harmful weed for crops. The bindweed is a perennial non-parasite weed, with strong vegetative breeding. The rhizome and the aerial parts of bindweed, called herba convolvuli, present medicinal properties (BERCA, 2004).

MATERIAL AND METHOD

The studies were performed during the agricultural year 2010 on the experimental field of the Herbology Area in the Didactic Agricultural Station Timişoara, being tested the effect of a number of 9 post-emergent herbicides on controlling bindweed in autumn wheat crops. The setting of the experimental field for controlling the bindweed in wheat crops was made using the method of the latin rectangle, a monofactorial experiment with 10 variants, in four repetitions, with a harvestable surface of a variant of 50 m^2.

The variety of autumn wheat used for the experiment was Lovrin 50, created in SCA Lovrin, approved in 1996 to be cultivated in field areas in the western and southern part of the country. The post-emergent herbicides were administered into the vegetation when the bindweed was in the rosette stage and the wheat in twinning stage, with an atmospheric temperature of 15°C.

The experimental variants were the following:

- V_1 – not treated;
- V_2 – *Rival Star 75 PU (Tribenuron – metil : 75%) – 20gr/ha;*
- V_3 – *SDMA (600 g/l acid 2.4 D dimethylamine salt) – 1 l/ha;*
- V_4 – *Dialen super 464 SL (Dicamba 120gr/l + 344gr/l acid 2.4D) – 0.9l/ha;*

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V_5 – Lancelot 450 WG (30% aminopiralidin acid fro m potassium salt + 15% florasulam) – 30 g/ha;
V_6 – Buctril Universal (Bomoxinil: 280gr/l + Acid 2.4D: 280gr/l)– 1l/ha;
V_7 – Ceredin Super (300 g/l acid 2.4 –D + 100 g/l dicamba) – 1 l/ha;
V_8 – Premiant (300 g/l acid 2.4 D + 100 g/l dicamba as dimethyl amine) – 1 l/ha;
V_9 – Banvel 480 S(Dicamba 480gr/l) –0,6l/ha;
V_{10} – Mustang (Florasulam: 6.25gr/l + Acid 2.4D: 300gr/l) – 0.5l/ha.

The following were evaluated:

- The degree of controlling the species *Convolvulus arvensis* L. in %; (the readings were made 15 days after herbicide-treatment and the marks were given according to the scale EWRS regarding the control of weeds in wheat crops);
- The production of wheat in 100 kg/ha on non-herbicide-treated variants and on herbicide-treated ones

RESULTS AND DISCUSSIONS

In table 1 are presented the species of weeds on the non-herbicide-treated variant, in the autumn wheat crops.

Table 1: The number of weeds on species in the non-herbicide-treated variant in wheat crops

Nr crt.	Weed species	Mean of the number of weeds/m^2	% share	Botanical class
1.	Stellaria media	14.93	25.74	A.d.
2.	Veronica hederifolia	11.74	20.24	A.d.
3.	***Convolvulus arvensis***	**11.33**	**19.53**	**P.d.**
4.	Lamium purpureum	8.63	14.88	A.d.
5.	Polygonum convolvulus	4.94	8.52	A.d.
6.	Cirsium arvense	2.15	3.71	P.d.
7.	Stachys annua	1.97	3.40	A.d.
8.	Galium aparine	1.30	2.24	A.d.
9.	Rubus caesius	0.70	1.21	P.d.
10.	Papaver rhoeas	0.20	0.34	A.d.
11.	Viola arvensis	0.11	0.19	A.d.
Total		**58.00**	**100**	

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

The presented results show that in 2010, in the control variant a number of 58.00 weeds/m^2 were registered of which 11.33 plants/m^2 are represented by *Convolvulus arvensis* L. with a percentage of participation of 19.53 %.

Annual dicotyledonous species like: *Stellaria media, Veronica hederifolia, Lamium purpureum, Polygonum convolvulus, Stachys annua, Galium aparine, Papaver rhoeas and Viola arvensis,* had a share of 75.55 %, while perennial dicotyledonous species like *Convolvulus arvensis* L., *Cirsium arvens* and *Rubus caesius*, represented 24.45 %.

As compared to the number of weeds in the non-herbicide-treated variant of 58.00 weeds/m², following the treatments applied, the number of weeds was reduced with 38.11 weeds/m² in the variant herbicide-treated with Premiant (1l/ha), up to 56.42 weeds/m² in the variant herbicide-treated with Dialen Super 464 SL (0,9l/ha).

The total control percentage is between 41.84% in variants herbicide-treated with Rival Super Star 75 PU (20g/ha) and 97.27% in variants herbicide - treated with Dialen Super 464 SL (0.9l/ha). The variants on which the control degree was over 80% are the following: Dialen Super 464 SL (0,9l/ha) 97.27%, Buctril Universal (1l/ha) 96.38%, Ceredin Super (1l/ha) 84.26% and Premiant (1l/ha) 81.20%. The lowest degree of weed control was registered in variants herbicide - treated with SDMA (1l/ha) 44.84 and Rival Super Star 75 PU (20g/ha) 41.84%.

Table 2: The reduction of weed number in the autumn wheat crops

Herbicide	Rate	Weed control EWRS grades	Number of weeds controlled	Control percentage		Significance of the difference
				Total	*Convolvulus arvensis* L.	
V_4- Dialen Super 464 SL	0.9l/ha	3	56.42	97.27	90.90	***
v_6- Buctril Universal	1l/ha	3	55.11	96.39	83.78	***
V_7- Ceredin Super	1l/ha	5	53.87	84.26	77.87	***
V_8- Premiant	1l/ha	6	49.14	81.20	67.45	***
v_9- Banvel 480 S	1l/ha	6	47.64	75.93	60.45	***
v_{10}- Mustang	0,5l/ha	7	45.56	67.44	56.56	***
V_5- Lancelot 450 GW	30g/ha	8	41.44	50.13	54.44	***
V_3- SDMA	1l/ha	8	39.43	44.87	50.13	***
v_2- Rival Super Star 75 PU	20g/ha	8	38.11	41.84	18.39	***
v_1- control (not treated)	-	9	**Mt**	0.00	0.00	-

$DL_{5\%}$=2.56 bur./m² $DL_{1\%}$=4.16 bur./m² $DL_{0.1\%}$=6.35 bur./m²
Significance: *** - very significant positive.

As for the exclusive control of the species *Convolvulus arvensis* L. the best results were recorded in the variants herbicide-treated with Dialen Super 464 SL, (0.9 l/ha).

The data in table 3 show that the greatest wheat crops achieved in 2010 were recorded in the variants herbicide-treated with Dialen Super 464 SL (0.9 1/ha), Banvel 480S (1 l/ha), Buctril Universal (1 l/ha), the productions being of 50.12 q/ha, 49.33q/ha and respectively 47.78q/ha. The differences to the field average are significantly positive. A significantly positive difference to the field average was recorded also in the variant herbicide-treated with Ceredin Super (1 l/ha).

The lowest productions were recorded on the variants herbicide-treated with Rival Super Star 75 PU (20g/ha), SDMA(1 l/ha), and the non-herbicide-treated variant (control), where production was of: 31.54 q/ha, 30.12 q/ha and 22.00 q/ha, the difference to the field average being highly significantly negative.

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Table 3: The experiemental results regarding the production in wheat crops

Herbicide	Rate	Absolute yield (q/ha)	Relative yield (%)	Difference in yield (q/ha)	Significance of the difference
V_4- Dialen Super 464 SL	0.9l/ha	50.12	125.17	+10.08	xxx
v_9- Banvel 480 S	1l/ha	49.33	123.20	+9.29	xxx
v_6- Buctril Universal	1l/ha	47.78	119.33	+7.74	xxx
V_7- Ceredin Super	1 l/ha	44.65	111.51	+4.61	xx
V_8- Premiant	1 l/ha	42.12	105.19	+2.08	-
V_5- Lancelot 450 WG	30g/ha	40.44	100.99	+0.40	-
Mean	-	**40.04**	**100.0**	**Mt**	-
v_{10}- Mustang	0.5l/ha	39.33	98.22	-0.71	0
v_2- Rival Super Star 75 PU	20g/ha	31.54	78.77	-8.50	000
V_3- SDMA	1 l/ha	30.12	75.22	-9.92	000
v_1- control (not treated)	-	22.00	54.94	-18.04	000

$DL_{5\%}$=2.60q/ha $DL_{1\%}$=3.90q/ha, $DL_{0.1\%}$=5.47q/ha
Significance: xxx - very significant positive;
xx - significant distinct positive;
0 - significant negative;
000 - very significant negative.

CONCLUSIONS

1. The bindweed is a ruderal and segetal weed, resistant to drought and with a wide ecological amplitude. In our country it is to be found practically in all cultures, every year, in all areas, being considered a problem weed, one of the most harmful species;
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 bindweed;
3. First were identified a total number of weeds of 58.0/m^2 in the control variant, of which *Convolvulus arvensis* L. had a share of 19.53 %, that is 11.33 plants/m^2.
4. The most efficient reduction of bindweed sprouts in the year 2010, was obtained with the herbicide Dialen Super 464 SL (0.9l/ha), with a control degree of 90.90%. A control of over 80 % of the total number of weeds was registered in the variants treated with Dialen Super 464 SL (0.9l/ha) 97.27%, Buctril Universal (1l/ha) 96.38%, Ceredin Super (1l/ha) 84.26% and Premiant (1l/ha) 81.20%.
5. In all herbicide-treated variants, after 30 days, but more noticeably after 60 days, the *Convolvulus arvensis* L. plants had the tendency of regenerating, releasing new sprouts, however no longer able to create real competition for wheat plants almost reaching maturity;
6. All tested herbicides were highly selective for the variety of wheat cultivated (Lovrin 50), presenting no visible signs of phytotoxicity;

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7. The wheat crops obtained in the experimental field were influenced, on one hand by the climatic conditions, and, on the other hand, were positively correlated with the performances of herbicides in controlling total weed-growth and that with bindweed.

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