CHEMICAL CONTROL WITH HERBICIDES AT SPECIES *AMBROSIA ARTEMISIIFOLIA* IN TIMISOARA

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Abstract: *Ambrosia artemsiifolia L., grass plant that is multiplied by seeds, invasive, planted annually, of late germination, which can reach heights up to 2 m, varies depending on the soil characteristics. It is spoted as present in Romania since 1908-1910. It is an invasive plant included in the Official List of Quarantine Weed. Their presense causes great losses in crop production. At Potatoes 30%, at beet 70% and at sunflowers we observe the fact that at a high level of infestation between 23.6 to 62.4 plants/m² determine losses included between 650-1680 Kg. Thework presents the method of chemical control of this species. Experiences based on the chemical control of the species Ambrosia artemisiifolia L. were made entirely on land belonging to Teaching and Experimental Station of Timisoara, operating legally under the patronage of the University of Agricultural Sciences and Veterinary Medicine of Banat. The experience field was done after the randomized blocks method, with four variants in three repetiotions. The treatments were applied in 3 feno phases of corn growth as follows: 13 – 14 BBCH, 15 – 16 BBCH and 18 – 20 BBCH, feno phases that cover well the periods of growth and development of corn plants. To combat Ambrosii following herbicides were used: Meister - conţeins 300 g/kg foramsulfuron + 10 g/kg iodosulfuron – methyl-sodium + 300 g/kg iodosulfuron-diethyl (safener); Laudis – conteins embotrione 44 g/l + isoxadifen-etil (safener) 22 g/l; Gardobuc – conteins 333 gl/l terbuthylazin +150 g/l Bromoxinil Heptonoat 214,7 g/l; Buctril Universal – conteins bromoxinil 280 g/l + acid 2,4-D (ester) 280 g/l. The four tested herbicides on corn crops have had a different efficiency in controlling Ambrosia artemisiifolia L; the Gardbouc and Buctril Universal herbicides being similar in efficiency and also superior to Laudis and Meister herbicides.*

Key words*: common ragweed, Ambrosia artemisiifolia,invasive, Romania, chemical control, loss of production*

INTRODUCTION

Ambrosia artemisiifolia L. is an invasive species included in The Official List of Quarantine Weed. The quality of weed quarantine has been attributed to it thanks to the fact that it became the main source of allergies in Europe. The harmfulness of this species is caused by allergic diseases caused by the bloom period, due to the large amount of pollen emitted into the atmosphere. This ecofiziologice germinating behavior and its characteristic makes it a successful pioneer species.

The first information on the presence of this species in Romania, dates since 1908-1910, when the plant was sporadically present throughout the country, in the area of Cluj. On the rocks in Sodorat and in the Somes plain, in the Banat area at Orsova. After 1990 they moved to massive deforestation, increased the number of abandoned fields and weed control was not done any longer.

Ambrosia artemisiifolia produces damage in agriculture: 30% at potatoes, 70% at beet, at sunflowers an outstanding fact is a high degree of infestation, between 23.6 to 62.4 plants / m² determine a large lead of between 650-1680/ kg.

Ambrosia artemisiifolia is an opportunistic species that has biological characteristics that allow it to become an invasive species in certain conditions. It does become a successful pioneer species concidering the fact that it can efficiently exploit the environmental resources

and survive extreme conditions in the field, plus the genetic and morphological plasticity (there are many ecotypes), and the ecofiziologice germinating behavior features.

Up until now all the researches made on ambrosia have highlighted the fact that the infestations in corn crops have brought great losses in production. Chemical control of ambrosia was done by Romanian researchers, such as N. HODOSIA (2006, 2007) as well as by foreign reseachers, suh as P. COMTOIS (2007) and SERGEY YA, with herbicides with a base of Flurasulam, Prosulfuron, Oxadiargil, Metribuzin, Bifenox, Clopiralid.

MATERIALS AND METHODS

Experiences based on the chemical control of the species *Ambrosia artemisiifolia L.* were made entirely on land belonging to Teaching and Experimental Station of Timisoara, operating legally under the patronage of the University of Agricultural Sciences and Veterinary Medicine of Banat, in 2009-2010, on a ground floor which contains a mold - drafts, with a humus content of 3.14% and 32% clay.

Teaching and Experimental Station, in terms of geomorphological forms is part of the great physical and geographical unit of Plain Banato-Crisana (BERINDE I. NEDELCU E., 1983). The Banat plain, is generally uniform at origins, it was later divided, when, after the withdrawal waters of Lake Pannonian, the orogenetice post-vlach movements of the early Holocene, led a last dip in the lower local basin Bega - Timis.

The experience field was done after the randomized blocks method, with four variants in three repetiotions. The randomizing of the variants was done on the recommendations of SAULESC N.A. and SAULESCU N.N. in 1967. The lengh of the parcels was of 25 m² and the widh of 25 m². The widh of the pathways between the repetions was of 1 m and they were executed with the a vegetable cutter.

The experimental variants have differed through:

¤ the application of different herbicides (four herbicides) used in controling the ambrosii,

¤ cycle (4 periods),

¤ the period of application of the treatment (3 periods)

The first factor introduced in the experiment was the period of herbicide application, that depended very much on the fen phases of growth and development of corn plants. The system used was that of description of feno phases, unanimously accepted in Western Europe to the decimal unitary code, named the BBCH code, an abbreviation of the 4 chemical corporations, great producers of pesticides, that created it, proposed it and used it: BAYER, BASF, CIBA-GEIGY and HOCHST. The treatments were applied in 3 feno phases of corn growth as follows: 13 – 14 BBCH, 15 – 16 BBCH and 18 – 20 BBCH, feno phases that cover well the periods of growth and development of corn plants. The first factor was applying the four herbicides in different variants and repetitions, as follows: Gardbouc, Laudis, Buctril Universal, Meister.

The second factor: the efficiency of the treatment with herbicides was watched for 7, 13, 21 and 31 days, respectively.

The third factor : four herbicides were taken into consideration, in order to control ambrosia. The herbicides were aplied preemergent, in three different periods, as follows: the 3-4 leaves period, the 5-6 leaves period and the 8-10 leaves .

Herbicides of the species *Ambrosia artemisiifolia L.,* was performed during the spring. This experience was done in the randomized blocks method of three repetitions, with the parcels having a surface of 25 m².

To combat Ambrosii following herbicides were used:

Meister - conteins 300 g/kg foramsulfuron + 10 g/kg iodosulfuron – methyl-sodium

+ 300 g/kg iodosulfuron-diethyl (safener);

Laudis – conteins embotrione 44 g/l + isoxadifen-etil (safener) 22 g/l

Gardobuc – conteins 333 gl/l terbuthylazin +150 g/l Bromoxinil Heptonoat 214,7 g/l

Buctril Universal – conteins bromoxinil 280 g/l + acid 2,4-D (ester) 280 g/l

The herbicides were applied pre emergent in order to control ambrosia in corn crops as well as other weeds from the crops. Every herbicide was applied in a single dose.

Detailing experience

Herbicide	Age treatment applications	Dose
Buctril (R1)	Age 3-4 leaves (B1)	1 l/ha
	Age 5-6 leaves (B2)	
	Age 8-10 leaves (B3)	
Meister (R2)	Age3-4 leaves (B1)	0.15 kg/ha
	Age5-6 leaves (B2)	
	Age8-10 leaves (B3)	
Laudis (R3)	Age 3-4 leaves (B1)	2 l/ha
	Age 5-6 leaves (B2)	
	Age8-10 leaves (B3)	
Gardobuc (R4)	Age3-4 leaves (B1)	1,5 l/ha
	Age5-6 leaves (B2)	
	Age 8-10 leaves (B3)	

After the herbicides have been applied, observations were made regarding the efficacity in controling ambrosia. The ambrosia plants were cut down at the height of 5-6 centimeters in order to see if the phenomenon of regeneration has taken place, at 35 days after herbiciding. The corn production was determined for corn with the humidity calculated at 15 % STAS (15%). The hybrid TURDA SUPER - FAO 320 was the one used in the experience.

Triliniar hybrid, semi-early, registered in the European Official Catlogue in 1996. Medium to heigh height, with 11 – 13 leaves with semi erect port. The corn cob presents 12 – 14 rows of corn grains. MMB: 280 – 320 g. The bilogical potential of this hybrid in normal climatic conditions, at a desity of 55 – 60.000 pl/ha is of 12 t/ha in non irrigated cultures.

From the researches it was shown that by applying herbicides at different times, they influence the regeneration rate of ambrosia.

RESULTS AND CONCLUZION.

The following table presents the degree of regeneration of ambrosia function of herbicide, in the periods 3 4, 5 - 6 and 8 - 10.

By analysing the results presented in Table 1, we can see that the regeneration process of ambrosia depends very much on the active substance of each herbicide and the dose applied by acre. The most efficient herbicide was proved to be Gardbouc, being elective in chemical controling of ambrosia. It was observed that the efficiency of this herbicide was constant in all periods. Thus, following the recommended dose by the producing company, the regeneration process in periods 3 – 4, 5 – 6 and 8 – 10 was of 0%. It results that for the applied dose (1 l/ha) the control rate was of 100 %.

On second place, there is the herbicide Buctril Universal, but not very much inferior to the Gardobuc herbicide.

Table 1

The regeneration rate of ambrosia treated with different herbicides

No. crt.	Herbicid	Time of application	Dose (l/ha)	The degree of regeneration (%)
1.	Witness (cultivated)	-	-	100
2.	Witness (hoeing 3)	-	-	15
3.	Laudis	3-4	2 l	6
		5-6	2 l	11
		8-10	2 l	35
4.	Buctril universal	3-4	1 l	0
		5-6	1 l	0
		8-10	1 l	2
5.	Gardobuc	3-4	1.5 l	0
		5-6	1.5 l	0
		8-10	1.5 l	0
6.	Meister	3-4	0.15 kg	32
		5-6	0.15 kg	42
		8-10	0.15 kg	54

The data presented in Table 1, show that for the recommended dose, the regeneration process of ambrosia in periods 3 – 4 and 5 – 6 is of 0% and in period 8 – 10 there was observed a degree of regeneration of 2%. Thus, it is shown that the control rate was of 98%. The Laudis herbicide has a much lower efficiency to the Gardobuc herbicide. The degree of regeneration for ambrosia treated with Laudis was of 6% in the period 3 – 4, of 11% in the 5 – 6 period and of 35% in the 8 – 10 period, for the recommended dose. It results that the degree of control for ambrosia was of 48%. On last place, there is the Meister herbicide, with a much lower efficiency that the Gardobuc herbicide. The regeneration degree of ambrosia was of 32% in the 3 – 4 period, of 42% in the 5 – 6 period and of 54% in the 8 – 10 period. The control degree of ambrosia was 32%. From the data presented in Table 1, it is shown that the Laudis and Meister herbicide have had the lowest degree of control, the degree of regeneration of ambrosia treated with theese herbicides being of 48% and 32% respectively, much more than with the Buctril Universal and Gardbouc herbicides.

Table 2

The grain production in corn treated with different herbicides

No. crt.	Herbicide	Time of application	Dose(l/ha)	Grain production	
				q/ha	%
1.	Witness(cultivated)	-	-	3,5	8,75
2.	Witness (hoeing 3)	-	-	40	100
3.	Laudis	3-4	2 l	10	25
		5-6	2 l	12	30
		8-10	2 l	24	60
4.	Buctril universal	3-4	1 l	40	100
		5-6	1 l	40,8	102
		8-10	1 l	39,2	98
5.	Gardobuc	3-4	1.5 l	40	100
		5-6	1.5 l	43,6	109
		8-10	1.5 l	44	110
6.	Meister	3-4	0.15 kg	4,8	12
		5-6	0.15 kg	7,2	18
		8-10	0.15 kg	10	25

From the analysis of the date presented in Table 2, it is shown that because of strong infestation with ambrosia of the un cultivated corn, the production of corn grains was of 3.5 kg/ha, representing only 8.75% from the production of the cultibated witness. In the variants treated with Gardbouc, for the recommended dose, it was registered the highest grain production: 40 – 44 q/ha. These productions are due to the very low regeneration rate of ambrosia. For Buctril Universal herbicide, the corn production was inferior to the one treated with Gardbouc herbicide. The lowest productions were registered for the variants treated with Laudis and Meister.

Table 1 shows the data obtained regarding the chemical control of the invasive species *Ambrosia artemisiifolia L.*

At the age of 3-4 leaves, thirty days after herbicide Gardobug (106.08%) and Buctril Universal (106.08%) proved to be superior in fighting Ambrosia. The second place was made by Laudis herbicide (102.36%). Last but not least was the herbicide Meister (85.47%) with the lowest control.

Table 3.

The significance of differences between the herbicides studied from the point of view controlling species like *Ambrosia artemisiifolia L.* at the age of 3-4 leaves (30 days) in 2010

No. crt	Herbicide	Period	Process control in the peroid of April 3-4 leaves (30 days)			Average (%) $\bar{x} \pm s_{\bar{x}}$	Relative control depending on the mark	Relative difference depending on the mark	Absolute difference Signific
			Rep I	Rep II	Rep III				
1.	Meister	3 - 4	77,96	76,00	87,74	80,57±3,63	85,47	-14,53	-13,70^{000}
2.	Buctril Universal	3 - 4	100,00	100,00	100,00	100,00±0,00	106,08	6,08	5,74*
3.	Gardobuc	3 - 4	100,00	100,00	100,00	100,00±0,00	106,08	6,08	5,74*
4.	Laudis	3 - 4	96,00	97,77	95,71	96,49±0,64	102,36	2,36	2,23
5.	The experience average	3 - 4	93,49	93,44	95,86	94,27±0,80	100,00	0,00	Witness

$DL_{5\%}$	$DL_{1\%}$	$DL_{0.1\%}$
5,43	7,90	11,84

Synthesis of the results obtained after the herbicides remain unchanged, Gardobuc si Buctril Universal shows most in combat against Ambrosia. In Table 4 are presented the experimental data on the effectiveness of herbicides at 5-6 leaf age. The percentage of combat against Ambrosia, obtained at this age is very high. In the first place were herbicide Gardobuc si Buctril Universal with a percentage of control 110.19% and 110.19%, second place with 101.42% was the Laudis herbicide, the percentage of combat is slightly larger than that of the 3-4 leaves age.

The presented data above can be seen that in the variants treated the situation encountered did not differ from age 5-6 leaves to 3-4 variants treated leaves ages, because of their effectiveness in ranking herbicides, Ambrosia combat has not changed. The percentage of each herbicide control decreased from age 3 to 4 leaves. The Best remain Gardobug and Buctril Universal.

In the stadium 8-10 leaves (table 5) the percentage of control obtained at the Ambrosia this time are smaller than the other two epochs. The most efficient herbicides were Gardobuc and Buctril, followed by the herbicide Laudis with a percentage of 94.40% and Meister with 59.88%.

Tabelul 4

The significance of differences between the herbicides studied from the point of view controlling species like *Ambrosia artemisiifolia L.* at the age of 5-6 leaves (30 days) in 2010

No. crt	Herbicide	Period	Process control in the peroid of April 3-4 leaves (30 days)			Average (%) $\bar{x} \pm s_{\bar{x}}$	Relative control depending on the mark	Relative difference depending on the mark	Absolute difference Signific
			Rep I	Rep II	Rep III				
1.	Meister	5 - 6	73,00	70,24	69,64	70,96±1,03	78,19	-21,81	-19,79^{000}
2.	Buctril Universal	5 - 6	100,00	100,00	100,00	100,00±0,00	110,19	10,19	9,25***
3.	Gardobuc	5 - 6	100,00	100,00	100,00	100,00±0,00	110,19	10,19	9,25***
4.	Laudis	5 - 6	93,50	92,88	89,74	92,04±1,16	101,42	1,42	1,29
5.	The experience average	5 - 6	91,63	90,78	89,85	90,75±0,51	100,00	0,00	Witness

DL 5%	DL 1%	DL 0.1 %
1,91	2,78	4,17

Table 5

The significance of differences between the herbicides studied from the point of view controlling species like *Ambrosia artemisiifolia L.* at the age of 8-10 leaves (30 days) in 2010

No. crt	Herbicide	Period	Process control in the peroid of April 3-4 leaves (30 days)			Average (%) $\bar{x} \pm s_{\bar{x}}$	Relative control depending on the mark	Relative difference depending on the mark	Absolute difference Signific
			Rep I	Rep II	Rep III				
1.	Meister	8-10	49,79	48,82	47,27	48,63±0,73	59,88	-40,12	-32,57^{000}
2.	Buctril Universal	8-10	99,62	99,50	99,44	99,52±0,05	122,56	22,56	18,32***
3.	Gardobuc	8-10	100,00	100,00	100,00	100,00±0,00	123,15	23,15	18,80***
4.	Laudis	8-10	76,79	77,66	75,52	76,66±0,62	94,40	-5,60	-4,54^{000}
5.	The experience average	8-10	81,55	81,50	80,56	81,20±0,32	100,00	0,00	Witness

DL 5%	DL 1%	DL 0.1 %
1,17	1,70	2,55

The efficacy of herbicides on the species *Ambrosia artemisiifolia* is smaller than the other two time periods of application, namely 3-4 and 5-6 leaves age. Yet in this period, we can seen that the results are worthy of consideration.

Table 6

The analysis of the variant regarding the effect of application ages, the application times and the degree of control of herbicide in *Ambrosia Artemisifolia L,* in 2010

Source of variation	SP	GL	S^2	Test F
Total	54510,11	179		
Recurrence	17,8	2	8,9	F=0,34
Period of application	4742,62	2	2371,31	F=90,92
Error of application periode	104,32	4	26,08	
Time	1109,12	3	369,71	F=22,71
Period x Time	17,4	6	2,9	F=0,18
Error while after application	293,04	18	16,28	
Herbicide	42435,41	4	10608,85	F=1082,54
Period x Herbicide	3205,49	8	400,69	F=40,89
Time x Herbicide	1204,09	12	100,34	F=10,24
Period x Time x Herbicide	440,05	24	18,33	F=1,87
Herbicides errors	940,8	96	9,8	

CONCLUSIONS

1.The four tested herbicides on corn crops have had a different efficiency in controlling Ambrosia artemisiifolia L; the Gardbouc and Buctil Universal herbicides being similar in efficiency and also superior to Laudis and Meister herbicides.

2. The regeneration degree of ambrosia was dependent on the period of application and the time. For example, the Laudis herbicide, presenting a regeneration rate of 6% in the 3 – 4 period, compared to a 35% rate of regeneration in the 8 – 10 period.

3. Corn productions were in complete correlation to the regeneration degree of ambrosia.

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