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WEED CONTROL IN SUNFLOWER CROP IN NORTH-EASTERN BUCHAREST

M. GÎDEA, N. ZAHIU, RALUCA FIERASTRĂIERU, ELENA ANGHEL, C. CIONTU

University of Agronomic Sciences and Veterinary Medicine of Bucharest

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Abstract

In Romania there are over 60% of the weed species occuring in Europe and the weeding extent of agricultural fields is very high.

Weed control is a technological measure which is a part of any cropping system. Sunflower crop is especially sensitive to weeding in the first 5-6 weeks after emergence and post emergent weed control is very delicate. There is a limited number of products available for dicotyledonous weed control and they must be applied according to the growing season of the weeds and the crop.

It is imperative for the farmers to set the best strategy for weed control (dicotyledonous after emergence) in maize crop and this helps implement a sustainable agriculture system to also preserve resources and insure steady yields.

Research was carried out in the pedoclimatic conditions of Moara Domneasca, in the years 2008 and 2009.

The experiment was bifactorial where factor A was weed control (Wt unhoed, Wt hoed, Focus ultra, Fusilade forte, Targa 10 EC, Modown 4 F, Racer 25 EC) and factor B was fertilization (unfertilized, $N_{100}P_{70}$).

The findings were that the weeding extent varied between 22.4% when applying the herbicide Racer under no fertilization and 61% for the herbicide Targa 10 EC under fertilization.

The mean yields obtained in the two experimenting years were between 1400 kg per ha when applying Modown and 410 kg per ha in the unhoed and unfertilized control.

INTRODUCTION

Introducing an agricultural precision system and elaborating a strategy of controlling weeds, which may answer to the needs for a long lasting agricultural system must preserve the biological diversity, to use small amounts of herbicide, to prevent the pollution of the soil and to be efficient.

Sunflower is the crop which becomes very sensitive to weeding during the first period of vegetation, up to the 6-8th level of leaves growth, this being the reason for which controlling the weeds, especially the dicotyledonous species, is a problem.

The target of the research was establishing the best active substances in order to control efficiently the weeding of the sunflower crop during its post-emerging period.

MATERIAL AND METHODS

In order to achieve the objective established in 2008 and 2009, a single factorial experience in 7 graduations was set up.

	Variant	Active substance	Period	Rate
a_1	Unhoed and unherbicided control	-		-
a_2	Hoed control	-		-
a_3	Focus ultra	Cicloxidim 100 g/l	post	3-4 l/ha
a_4	Fusilade forte	Fluazifop-P-butil 150 g/l	post	1.3 l/ha
a_5	Targa 10 EC	Quizalofop-p-etil 100 g/l	post	0.4 l/ha
a_6	Modown 4 F	Bifenox 480 g/l	post	1.5 l/ha
a_7	Racer 25 EC	Fluorocloridon 250 g/l	post	3 l/ha

Research took place in the experimental field of Weed Science Department.

It was done in four sequences.

Fertilization was done in two parts when preparing the seed bed and a 50% of dosage was applied on it, while the rest was applied on vegetation.

Sowing was realized on the 2nd of April 2008 and on the 25th of March 2009, and springing was seen on the 11th of April 2008 and on the 15th of April 2009.

RESULTS AND DISCUSSION

Three weeks after the sunflower crop sprung, before applying the herbicide treatment, the range of weeding was determined as seen in Table 1- for which the average, the participation and the constant were calculated. When analyzing the data from chart 1 one can see that there a number of 16 species of weeds was identified out of which 5 were annual dicotyledonous species, 2 perennial dicotyledonous species, 2 annual monocotyledonous species and a perennial monocotyledonous species. To all these, a number of 5 annual dicotyledonous species of 1% participation are added.

The average number of plants from each species varied from 0.6 pl/mp for *Cirsium arvense* and 5.6 pl/mp for *Setaria* sp., and the average number of weeds was of 30.4 pl/mp. The participation of different species was between 0.6% for *Convolvulus arvense* and of 20.9% for *Setaria* sp., while the dicotyledonous species represented 55.48%. The constant of weed species in the sunflower solarium after 50 determinations varied between 46% for *Cirsium arvense* and 86% for *Xanthium strumarium.*

In Table 2 presents the results of the determinations of the sunflower crop weeding structure 2 weeks after applying the post-emerging treatments. Analyzing the data from the table, one can see that in the inbred control variant there was a number of 39.7 weeds/mp, out of which 19.4 pl/mp were annual dicotyledonous. For the bred control the number of weeds falls up to 2.2 pl/mp, out of which sorgum halepense represents 1.2 pl/mp, the other species being represented in a much smaller number.

Table 1

Weeding of the sunflower crop before applying post-emerging treatments (average,participation, constant)

Species	Average	Participation (%)	Constant (%)	
Amaranthus retroflexus	2.5	7.7	80	Other species: *Fumaria* sp. *Abutilon theophrasti, Capsella bursa-pastoris, Strellaria media, Viola tricolor*
Chenopodium album	1.3	4	82	
Hibiscus trionum	2.3	7.1	76	
Portulaca oleracea	2.2	6.8	80	
Solanum nigrum	2.8	8.6	70	
Xanthium strumarium	5.1	15.7	86	
Annual dicotyledonous	**16.2**	49.8		
Convolvulus arvensis	1.7	5.2	76	
Cirsium arvense	0.2	0.6	46	
Perenial dicotyledonous	**1.9**	5.8		
Setaria sp.	5.6	20.9	58	
Echinochloa cruss-galli	4.2	15.7	52	
Annual monocotyledonous	**9.8**	36.6		
Sorghum halepense	2.5	7.7	58	
Perenial monocotyledonous	**2.5**	7.7		
Total	**30.4**	100		

It is seen that, when applying the herbicide treatment comparing with the inbred control there had been some downfalls on the average number of weeds, to values between 17.3 pl/mp when applying Targa 10 EC and to 26.7% when applying Racer 25 EC. The greatest amount of weeding was seen in the variants treated with Modown, while the smallest amount of weeding was seen in the variants treated with Targa 10 EC. Herbicides Focus ultra, Fusilade forte and Targa 10 EC especially reduced the number of weeds from the monocotyledonous species, while herbicides Modown 4 F and Racer 25 EC reduced the weeding with the dicotyledonous species.

In Table 3 there are the data regarding the degree of fighting against weeds from the sunflower crop 2 weeks after applying the post-emerging treatments. Analyzing the data from the table, we can see that, in comparison with the inbred control where the degree of fighting against the weeds is of 0%, applying the herbicide

treatments has determined a growth in the degree of weed control up to values from 24.7% for Modown 4 F to 52.2% for Targa 10 EC.

It is seen that herbicides Focus ultra, Fusilade forte and Targa 10 EC determine a degree of fighting against monocotyledonous species of over 98.6%, while herbicides Modown 4F and Racer 25 EC fight against dicotyledonous weeds up to 50% but only fight 1.6% against monocotyledonous species.
In Table 4 there are the specific weed-herbicide patterns in the sunflower crop after the research done in 2008 and 2009 in the weather conditions from the M Domneasca.

It is seen that Focus ultra controls well the monocotyledonous species and amaranthus retroflexus. Herbicide Fusilade forte fights against monocotyledonous species. Targa 10 EC efficiently controls the annual monocotyledonous species. Herbicide Modown 4F efficiently controls the annual dicotyledonous species. Herbicide Racer 25 EC fights against dicotyledonous species except for amaranthus and hibiscus trionum.

CONCLUSIONS

1. Herbicides Focus ultra, Fusillade forte, Targa 10 EC reduced the number of weeds from the annual and perennial monocotyledonous species, reduced the weeding degree from these species and had a degree of 100% when fighting against them.
2. Herbicides Modown 4F and Racer 25 EC reduced the number of weeds from the dicotyledonous species, reduced the weeding degree with dicotyledonous species and had an 80% degree of fighting against the annual dicotyledonous species.
3. Based on the determinations the specific weed-herbicide patterns for the sunflower crop the following conclusions were drawn:
4. In the sunflower crop, the chemical control of the dicotyledonous species is poor, *Xanthium strumarum, Convolvulsus arvensis, Cirsium arvense.*
5. Focus ultra - *Amaranthus, Setaria* sp., *Echinochloa cruss-galli, Sorghum halepense.*
6. Fusilade forte - *Setaria* sp., *Echinochloa cruss-galli, Sorghum halepense*.
7. Targa 10EC - *Cirsium arvense, Setaria* sp., *Echinochloa cruss-galli, Sorghum halepense*.
8. Modown 4F - *Amaranthus retroflexus*, *Chenopodium album, Hibiscus trionum, Portulaca oleracea, Xanthium strumarium.*
9. Racer 25EC - *Amaranthus retroflexus, Chenopodium album, Portulaca oleracea, Solanum nigrum.*

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Table 2

Weeding structure in the sunflower crop 3 weeks after applying the post-emerging treatments (nr. mediu/m^2) (average2008-2009)

	Variant	*Amaranthus retroflexus*	*Chenopodium album*	*Hibiscus trionum*	*Portulaca oleracea*	*Solanum nigrum*	*Xanthium strumarium*	*Convolvulus arvensis*	*Cirsium arvense*	*Setaria* sp.	*Echinochloa cruss-galli*	*Sorghum halepense*	Da*	Dp**	Ma***	Mp***	Total
a_1	Unhoed and unherbicided control	2.8	1.4	2.6	3.6	2.8	6.2	1.8	0.8	6.8	7.1	3.8	19.4	2.6	13.9	3.8	39.7
a_2	Hoed control	0	0	0	0	0	0	0.8	0.2	0	0	1.2	0	1	0	1.2	2.2
a_3	Focus ultra	0.2	1.3	2.6	3.8	0.8	6.1	1.7	0.6	0	0	0.2	14.8	2.3	0	0.2	17.3
a_4	Fusilade forte	2.7	1.2	2.4	3.4	2.4	5.8	1.6	0.4	0	0	0	17.9	2	0	0	19.9
a_5	Targa 10 EC	1.2	1.1	1.3	3.4	2.2	4.2	1.5	0.2	0.2	0	0.2	13.4	1.7	0.2	0.2	15.5
a_6	Modown 4 F	0.2	0.2	0.4	0.4	0.6	2.2	1.6	0.6	5.9	6.1	3.4	4	2.2	12	3.4	21.6
a_7	Racer 25 EC	0.2	0	2.4	0.2	0.2	4.9	1.8	0.5	6.5	6.4	3.6	7.9	2.3	12.9	3.6	26.7

*Annual dicotyledonous, **Perenial dicotyledonous, ***Annual monocotyledonous, ****Perenial monocotyledonous

Table 3

Degree of fighting against weeds in the sunflower crop 2 weeks after applying the post-emerging treatments (%)

	Variant	*Amaranthus retroflexus*	*Chenopodium album*	*Hibiscus trionum*	*Portulaca oleracea*	*Solanum nigrum*	*Xanthium strumarium*	*Convolvulus arvensis*	*Cirsium arvense*	*Setaria* sp.	*Echinochloa cruss-galli*	*Sorghum halepense*	Da*	Dp**	Ma***	Mp****	Total
a_1	Unhoed and unherbicided control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
a_2	Hoed control	100	100	100	100	100	100	55.6	75.0	100	100	68.4	100	61.5	100	68.4	94.5
a_3	Focus ultra	92.9	7.1	0.0	-5.6	71.4	1.6	5.6	25.0	100	100	94.7	23.7	11.5	100	94.7	56.4
a_4	Fusilade forte	3.6	14.3	7.7	5.6	14.3	6.5	11.1	50.0	100	100	100	7.7	23.1	100	100	49.9
a_5	Targa 10 EC	57.1	21.4	50.0	5.6	21.4	32.3	16.7	75.0	97.1	100	94.7	30.9	34.6	98.6	94.7	61.0
a_6	Modown 4 F	92.9	85.7	84.6	88.9	78.6	64.5	11.1	25.0	13.2	14.1	10.5	79.4	15.4	13.7	10.5	45.6
a_7	Racer 25 EC	92.9	100	7.7	94.4	92.9	21.0	0.0	37.5	4.4	9.9	5.3	59.3	11.5	7.2	5.3	32.7

*Annual dicotyledonous, **Perenial dicotyledonous, ***Annual monocotyledonous, ****Perenial monocotyledonous

Table 4

Specific weed-herbicides patterns in the sunflower crop

	Variant	*Amaranthus retroflexus*	*Chenopodium album*	*Hibiscus trionum*	*Portulaca oleracea*	*Solanum nigrum*	*Xanthium strumarium*	*Convolvulus arvensis*	*Cirsium arvense*	*Setaria* sp.	*Echinochloa cruss-galli*	*Sorgum halepense*	Da*	Dp**	Ma***	Mp****	Total
a_1	Unhoed and unherbicided control	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
a_2	Hoed control	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
a_3	Focus ultra	**YES**	NO	NO	NO	YES	NO	NO	NO	**YES**	**YES**	**YES**	NO	NO	**YES**	**YES**	NO
a_4	Fusilade forte	NO	NO	NO	NO	NO	NO	NO	NO	**YES**	**YES**	**YES**	NO	NO	**YES**	**YES**	NO
a_5	Targa 10 EC	NO	NO	NO	NO	NO	NO	NO	**YES**	**YES**	**YES**	**YES**	NO	NO	**YES**	**YES**	**YES**
a_6	Modown 4 F	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	NO	NO	NO	NO	NO	**YES**	NO	NO	NO	NO
a_7	Racer 25 EC	**YES**	**YES**	NO	**YES**	**YES**	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

*Annual dicotyledonous, **Perenial dicotyledonous, ***Annual monocotyledonous, ****Perenial monocotyledonous