

## THE EFFECTS OF HERBICIDES WITHIN THE PRODUCTIVE ELEMENTS OF THE SUNFLOWER

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**Keywords:** sunflower, herbicides, elements of productivity, mass of 1000 grains, hectolitic mass, amount of sunflower oil.

### ABSTRACT

*During the period of 2010-2012, within the experimental field of SCDA Simnic, an experiment has been placed, in which multiple methods of weed control have been tested in order to improve the productivity of sunflower crops: without hoeing, manually hoed twice, mechanically hoed twice, manually hoed twice + mechanically hoed twice, acetochlor 900 g/l, dimethenamid 720 g/l, pentoxamid 600 g/l, s-metolachlor 960 g/l, acetochlor 900 g/l + oxiflufen 480 g/l, fluazifop-p-butyl 150 g/l, fluorocloridan 230 g/l. The study of the herbicides' effects upon the productivity elements has revealed that, when applying 900 g/l of acetochlor + 480 g/l oxiflufen, the mass of 1000 grains is closer to the appliance of the crops that were manually hoed twice and then mechanically cropped twice. Most of the results of the applied herbicides had resulted in roughly the same amount of sunflower seeds : 26-27%. The lowest amount of sunflower oil resulted from applying herbicides upon the vegetation.*

### INTRODUCTION

The sunflower is an economically relevant plant, whose main use is its edible oil. Roughly 80% of its economical worth is derived out of its edible oil. The seed is composed out of a kernel and a peel, which are separated during the process of obtaining the sunflower oil. The percentage of sunflower peels varies for the hybrid versions between 17% and 40%. The amount of sunflower oil found within the kernel can peak 68% for the most successful of hybrids (Berca, 2011). The main feature which made the sunflower stand out from the other plants which serve only an aesthetic purpose is the very high amount of oil found within the seed and the high food value it offers. This guarantees its stability within the food market. During the process of extracting the sunflower oil, a notable amount of groats that are rich in proteins is obtained (35,7-47,8%), which can effectively be administered to bovines, birds and rabbits. (Vrânceanu and co., 2000)

### MATERIALS AND METHODS

In Romania weeds are filling up more and more infield, therefore all of the specified methods of weed control must be utilized, including the chemical ones, in order to effectively reduce the negative effect this has upon the agricultural productivity. The main reason why weeds are seen in such large quantities is the high amount of weed seeds that is found within the soil of our inlands. The purpose of this study is to study the direct effects that weeds have upon the productivity levels.

In order to clarify the effects of applying specific herbicides upon the sunflower inlands, certain factors have been taken into account : the mass of 1000 grains, the hectolitic mass, the percentage of peels, the percentage of hollow seeds and the amount of sunflower oil.

The study has been performed within the Agricultural Research and Development Station of Șimnic, during the period of 2010-2012, upon a low quality soil with slight acidity. The randomized blocks method has been used, with 4 repetitions, using a plot of 21 m<sup>2</sup>. The herbicides have been applied during the preemergent state (after the seeding of the sunflower) and then again during the postemergent state (upon the vegetation) when the

plant already has between 4 and 6 leaflets and the monocot weeds are between 10 and 15 cm.

The experimental variants were:

<b>1</b>	<b>without hoeing</b>
<b>2</b>	<b>manually hoed twice</b>
<b>3</b>	<b>mechanically hoed twice</b>
<b>4</b>	<b>manually hoed twice + mechanically hoed twice</b>
<b>5</b>	<b>Acetoclor 900 g/l</b>
<b>6</b>	<b>Dimetenamid 720 g/l</b>
<b>7</b>	<b>Pentoxamid 600 g/l</b>
<b>8</b>	<b>s-metolaclor 960 g/l</b>
<b>9</b>	<b>Acetoclor 900 g/l +oxiflurfen 480 g/l</b>
<b>10</b>	<b>Fluazifop-p-butil 150 g/l</b>
<b>11</b>	<b>Fluorocloridan 230 g/l</b>

The following herbicides have been applied:

<b>Active substance</b>	<b>Commercial product</b>	<b>Dose 1/ha</b>	<b>Time of appliance</b>
Acetoclor 900 g/l	Regal	2	preem
Dimetenamid 720g/l	Frontier forte - monocot per year and dicot perennials	1	preem
Fluazifop-P-butil 150 g/l	Fusilade forte -monocot	1	postem
Fluorocloridon 230 g/l	Racer 25EC -dicot per year	1	postem
Oxifluorfen 480 g/l	Goal 4F -dicot weeds per year	0,5	preem
Pentoxamid 600g/l	Succesor 600 -monocot and some dicot weeds	3	preem
s-metolaclor 960 g/l	Dual Gold 960 EC -monocot + dicot	1,5	preem

For the purpose of this experiment the Performer hybrid was used. It is a simple hybrid, registered in 1998, with the same of 170-180cm. The inflorescence is large and solid, resilient to the human hand and to rot and the staining of the strain. The mother line is very productive. The vegetation period is between 127 and 130 days, belonging to the C group of precocity. The amount of oil is between 51% and 53%. The production capacity is between 3800-4000 kg/ha.

## **RESULTS AND DISCUSSION**

The effective use of herbicides is a safe way of increasing the productivity levels of the crops since they will reduce the negative impact of the weeds to a minimal level, thus allowing an economical improvement.

By analyzing the offered data it can be noted that the samples on which herbicides have been applied showed less promising results, varying between 51,3 and 58,5 g per 1000 grains, compared to the samples which had been manually hoed twice and then mechanically hoed twice (62,7g).

**Table 2.**

**Elements of Productivity of the Sunflower Crop  
(MMB, HM, percentage of hulls and seeds) Average of 2011-2013**

Nr.	Variant	Dose	Age of application	MMB (g)	MH (kg/hl)	% coji	% dry seeds
1	without hoeing	-	-	50,1	33,7	27	15,25
2	manually hoed twice	-	-	56,4	35,2	26	9,4
3	mechanically hoed twice	-	-	54,3	33,4	26	10,45
4	manually hoed twice + mechanically hoed twice	-	-	63,7	40,85	26	7,4
5	Acetoclor 900 g/l	2	preem	53,6	39,15	26	11,3
6	Dimetenamid 720 g/l	1	preem	53,8	39,25	25	11,6
7	Pentoxamid 600 g/l	3	preem	54,3	38,2	25	10,7
8	s-metolaclor 960 g/l	1,5	preem	55,1	39,25	26	10,3
9	Acetoclor 900 g/l +oxiflufen 480 g/l	2+0,5	preem	58,5	40,3	26	9,8
10	Fluazifop-p-butil 150 g/l	1	postem	52,3	38,0	25	11,9
11	Fluorocloridan 230 g/l	2	preem	51,1	36,14	25	12,3

The lowest values have been found where herbicides had been applied on the vegetation in order to control monocot weeds (Fusilade forte) and dicot weeds (Racer) which had a MMB of 52,3g / 51,1g.

On the subjects where the Regal and Goal herbicides have been applied during the early stages of growth in order to control monocot and dicot weeds, the MMB was of 58,5g, 6-7g higher than the results of the subjects on which the Fusilade forte and Racer herbicides have been applied. The Dual Gold herbicide displayed a MMB of 55,0g. The variant which had 2 manual hoeing and 2 mechanical ones had the best MMB- 50,1g.

The hectolitic mass. According to the aforementioned data, the same HM values can be seen as for the mass of 1000 grains. Out of the 7 studied variants which involved herbicides, the HM values were most similar to the 2 manual hoeing + 2 mechanical hoeing versions, with a difference of only 1,6-1,7kg compared to 2 of the variants. The differences were of 2,85-4,71 kg/hl.

For the variant which had no hoeing, the HM levels were the lowest (33,7 kg/hl). The variant which had both mechanical and manual hoeing displayed the highest level of HM (40.85 kg/hl). The percentage of hulls ranged between 25-27%. The lower value was obtained from the variants treated with herbicides on the vegetation. The value of 7.4% hollow seeds was obtained from the variants which were manually hoed twice and mechanically hoed twice. The highest percentage however was obtained from the variant which did not receive any hoeing (15.25%). A low amount of hollow seeds had been obtained from the variant which was treated with the Regal + Goal 4F herbicides.

Based on the second table it is understood that the mixture of herbicides which is applied has a direct impact on the results.

**Table 2.**

**The Effect of Herbicides on the Sunflower Crops Oil Amount – Average of 2011-2013**

Nr.	Variant	Dose	Age of application	sunflower oil (%)	%	Dif.	semnif
1	without hoeing	-	-	45,6	82	-9,9	ooo
2	manually hoed twice	-	-	52,2	94	-3,3	
3	mechanically hoed twice	-	-	51,3	92	-4,2	
4	manually hoed twice + mechanically hoed twice	-	-	55,5	100	Mt	
5	Acetoclor 900 g/l	2	preem	50,4	91	-5,1	o
6	Dimetenamid 720 g/l	1	preem	50,8	92	-4,7	o
7	Pentoxamid 600 g/l	3	preem	51,1	92	-4,4	o
8	s-metolaclor 960 g/l	1,5	preem	51,2	92	-4,3	o
9	Acetoclor 900 g/l +oxiflurfen 480 g/l	2+0,5	preem	52,4	94	-3,1	
10	Fluazifop-p-butil 150 g/l	1	postem	48,3	89	-6,2	oo
11	Fluorocloridan 230 g/l	2	preem	48,6	87	-6,9	oo
	DL 5%			4,5			
	DL 1%			5,7			
	DL 0,1%			7,1			

In comparison with the variant which was manually hoed twice and then mechanically hoed twice, all of the other variants had a lower percentage of produced oil (48.6-51.2%). The lowest amounts were obtained from the variants which had herbicides applied on the vegetation (Fusila de forte + Racer). The variant which did not receive any hoeing displayed the lowest amount out of all (45.6%).

### CONCLUSIONS

The variant which used the Regal and Goal herbicides had similar results to the one that was manually hoed twice and mechanically hoed twice. All of the other variants displayed lesser amounts (7.6-11.6g). Herbicides offered values of hectolitric mass similar to the ones of the hoed variant. All of the variants treated with herbicides displayed roughly the same amount of hulls (26-27%). All of the variants that were treated with herbicides displayed superior results of hollow seeds compared to the hoed ones (>2.4-4.9%). The lowest amounts of sunflower oil were obtained from the variants which were treated with herbicides.

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