

SIMPLE AND EFFICIENT IMPLEMENTATION OF COMBINED HERBICIDES IN THE WEED CONTROL OF SUNFLOWER CULTURE

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ABSTRACT

For two years, 2010 and 2011, the SCDA Șimnic has made an experiment aimed to research the effectiveness of simple and combined herbicides against weeds in sunflower crop and production determination for tested combinations. For monocotile weeds and annual Dicota the following herbicides were used: acetochlor, pendimethalin, dimethenamid, metolachlor, oxadiargil; oxifluorfen; Pethoxamide; Fluazifop-P-butyl; quizalfop-tefuril, acetochlor + diclormid. The selectivity antramineice treatments with herbicides showed good results for antidicotiledoneice (oxifluarfen and oxadiargil). By applying herbicides during the sowing, the effectiveness against annual monocotile weeds (*Echinochloa*, *Setaria*) was of 93-98%. Combinations that showed the highest success rates were acetochlor and acetochlor + + oxifluarfen diclormid + oxadiargil.

INTRODUCTION

Sunflower is the leading oilseed of our country. Sunflower, wheat, corn and soybean were the leading crops in the SW of Oltenia until 1989 (Alexandrina Popescu, 2007).

Sunflower is currently still a favorite crop of the private cultivator because it is greatly needed in the industry and due to the mild need for fertilizers and the complete mechanization of its required technology (Berka, 2004). It is also a crop that is able to deal well with the presence of weeds, at least in the second part of its growing period. In the first 6-7 weeks of growth, the sunflower requires help in terms of weed control to avoid the possible competition and the recorded losses. (Francesco & Zora, 1992, Millet & Coulomne, 1992). Sunflower is strongly threatened by a wide range of annual and perennial weed species. The most representative species are annual monocotiledonatele (*Echinochloa crus galli*, *Setaria glauca*, *Digitaria sanguinalis*) and perennial (*Sorghum halepense*), dicotyledonous (*Amaranthus retroflexus*, *Chenopodium album*, *Sinapis arvensis*, *Xanthium strumarium*) or perennial (*Cirsium arvense*, *Convolvulus arvensis*) (Snake, 1987). Coping strategies are largely focused on agricultural practices, the use of herbicide resistant crops so that the success will be marginal (Rubiales et al., 2009). Although the new methods for detecting weeds in sunflower fields using satellite imagery show the weeds in a late stage of growth which could be used to create charts of high accuracy, which can prove to be most efficient, they are prohibited because of their high price. (Lopez-Granados, 2011). Chemical control is the only effective way to prevent weed competition in the early stages of growth of sunflower plants (Covarelli, 1997).

MATERIALS AND METHODS

The experiments were conducted in 2010-2011 in ARDS Șimnic on a Luvisol containing 1.9% humus, 41% clay and a pH of 5.7. During these two years the Performer hybrid has been developed. The experiments were conducted using the randomized block method in four repetitions using surface plots of 21 m². For monocotile weeds and annual Dicota the following herbicides were used: acetochlor, pendimethalin, dimethenamid, metolachlor, oxadiargil; oxifluorfen; Pethoxamide; Fluazifop-P-butyl; quizalfop-tefuril, acetochlor + diclormid. After applying herbicides during the sunflower vegetation, observations were made on the selectivity and efficiency of herbicides. Gravimetric

determinations were also performed (before harvest) on the weeds on which the herbicides did not prove efficient and on the seed production of each plot.

RESULTS AND DISCUSSION

In the two years of experimentation in the untreated control plot with herbicides the following annual and perennial weed species, both monocotyledonous and dicotyledonous have been found: *Echinochloa crus galli*, *Setaria glauca*, *Chenopodium album*, *Amaranthus retroflexus*, *Xanthium strumarium*, *Cirsium arvense*, *Convolvulus arvensis*. The degree of annual monocotile weed infestation was of 75% and the degree of annual perennial weed infestation was of 25%. Phytotoxic symptoms on sunflower plants were recorded in the following combinations: acetochlor + oxifluorfen (Note 2) and acetochlor + + oxadiargil diclormid (Note 3) (Table 1). The rest were selective herbicides for the sunflower. Given the above weed infestation, treatments applied pre-emergently achieved good efficiency (93-97%) against annual monocotile weeds and some annual

Dicota mainly due to the precipitations and the reduced infestations after treatment (10%) of the perennial weeds (*Cirsium*, *Convolvulus*).

Table 1

Selectivity and efficacy of herbicides tested - the average of 2010 and 2011

Herbicide	Dose/ha	Age	Selectivity	Degree of infestation
Witness untreated	-	-	1	0
Acetochlor	2	preem	1	96
Dimetenamid	1,5	preem	1	96
Metolaclor	1,5	preem	1	97
Pendimetalin	4	preem	1	95
Pentoxamid	3	preem	1	93
Acetochlor+oxifluorfen	2+1	preem	2	98
Acetochlor+diclormid+oxadiargil	1,75+0,75	preem+post	3	98
Fluazifop-P-butyl	1	post	1	80
Quizalfop-tefuril	1	post	1	80

The combination treated with acetochlor + oxifluorfen (98%) showed a high success rate against mono and dicotiledonate annual weeds - the use of pre-emergent or two separate treatments, the first one using a graminicid during sowing (acetochlor + diclormid) and the second one during vegetation using oxadiargil. Fluazifop-P-butyl-tefuril quizalfop treatments applied during vegetation to control only the annual monocotile weeds achieved a lower efficiency rate (80%) in weed control, mainly due to exceeding the optimum treatment phase of the monocotile species. Overall the obtained production was correlated with the degree of weed control. Production was directly influenced by the weeds. By examining the data we can see that there are two remarkable herbicide treatments, the first one being mostly pre-emergent applied antigramineicly and the second one being pre-emergent applied antidicotiledoneic or postemergent (Table 2).

Table 2

Sunflower yields obtained by herbicide treatment - average of 2010 and 2011

Herbicide	Dose/ha	Average yield for 2 years		
		Kg/ha	diff	%
Witness untreated	-	890	-	-
Acetochlor	2	2544	1654	285
Dimetenamid	1,5	2593	1703	291
Metolaclor	1,5	2672	1782	300

Pendimetalin	4	2430	1540	273
Pentoxamid	3	2211	1321	248
Acetoclor+oxifluorfen	2+1	2820	1930	317
Acetoclor+diclormid+oxadiargil	1,75+0,75	2768	1878	311
Fluazifop-P-butil	1	1706	816	192
Quizalfop-tefuril	1	1760	870	198

Combinations that have obtained the highest yields are acetochlor + oxifluorfen with a rate of 317% compared to the untreated control and acetochlor + + oxadiargil version, with a rate of 311% of the control variant. Good yields were also obtained with pre-emergent treatments with production differences ranging between 1321 and 1782 production kh / ha compared to the control. As illustrated, the relationship between weed control and production is positive. The correlation coefficient ($r = 0.893$) is very significant.

CONCLUSIONS

- Very good selectivity of antigramineice herbicide treatments and good for antidicotiledoneice herbicide treatments (oxifluorfen and oxadiargil).
- Achieving a degree of control of 93-98% of annual monocotile weeds (Echinochloa, Setaria) by applying herbicides during sowing.
- A very high rate of 80-90% obtained in annual dicots control by applying pre-emergent herbicides based oxifluorfen or postemergentă oxadiargil based herbicides.
- The effectiveness of applying herbicides was determined based on the climatic conditions that year and the variety of the tested weeds.
- The pre-emergently applied herbicides showed the most promising results in sunflower seed productions.

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