

RESEARCHES REGARDING TO DECREASING OF INFESTATION DEGREE FROM SUNFLOWER CROP USING CHEMICAL METHODS

Cornelia Ciobanu*, Gheorghe Ciobanu, Ramona Albu, Adrian Vuscan

*University of Oradea, Faculty of Environmental Protection, 26 General Magheru St., 410048 Oradea, Romania, e-mail: scdaoradea@yahoo.com

Abstract

This paper is based on the researches made in 2009-2010 in preluvo soil condition from Oradea. Sunflower crops presents a strong infestation with weeds (over 75-85%) like annual monocotyledonous species (46%) and annual (44%) and perennial (10%) dicotyledonous weeds.

*Accumulation of a total biomass by 1980 g/m² necessitate control measures including chemical measure despite the belief that sunflower had a good capacity to fight against weeds infestation. For the control of annual grasses weeds and of sensitive dicotyledonous species (*Amaranthus retroflexus*, *Chenopodium album*, *Raphanus raphanistrum*, *Polygonum* sp.) the associate herbicides applied preemergent (Trophy Super, Pendigan, Frontier forte) with Linuron or Racer and assured an efficacy by 90-92%.*

For decreasing of annual mono and dicotyledonous weeds infestation the application of postemergent treatments with Raft 400 + Agil, Goal 4F + Gallant Super when sunflower have 4-6 leaves (2-4 leaves in the case of herbicide Goal 4F) realized an control of weeds about 90%.

Tested herbicides contribute to decreasing of biomass quantity comparative with untreated variant which had values between 93.1-94.5%.

Key words: Sunflower, herbicides, infestation degree, weeds, efficacy

INTRODUCTION

Sunflower crops it's infested not only with many species of weeds but some of these are very dangerous in virulence and high quantity of the weeds which could decide the level of harvest.

At the establishing of crop technologies an important point of view it's made by control methods of annual and perennial weeds along with type of hybrids with 70-90% depending on the soil infestation.

For the setting up of appropriate control program of weeds it's necessary the knowledge of principals weeds which generate losses of crop yield, respectively the problematic weeds.

In a completely strategy of weeds control can not miss the chemical methods using herbicides. We have to notice that sunflower is hostile from this point of view in that the annual weeds like *Xanthium*, *Ambrosia* and the perennial dicotyledonous weeds like *Cirsium*, *Sonchus*, *Amaranthus* are present in all of the sunflower crops and currently are not full controlled by the approved herbicides. In the last 20 years just a few herbicide with new action type came to the market. There are considerable differences among the new sunflower hybrids with respect to their herbicide-sensitivity, and it has an importance in their productivity and in the results of their production (Lehoczky et al. 2002, Lehoczky and Buzsáki 2005).

Actually researches were based on using new molecules with a good efficacy in weeds infestation from sunflower crop.

MATERIAL AND METHODS

The researches were made in the experimental fields from Agricultural Research and Development Station from Oradea in the years of 2009-2010 in the preluvosoil conditions having 2.3% humus content, 31.55% clay and 5.5 pH.

The researches made between 2009-2010 included 6 experimental variants set up using the randomized blocks in 4 replications with 25 m² plot size. The herbicides Raft (*oxadiargil*), Galigan (*oxifluorfen*), Linurex 50 SC (*linuron*), Racer (*fluorocloridon*) and Goal 4 F (*oxyfluorfen*) have good effect against annual dicotyledonous weeds, while the Trophy Super (*acetoclor*), Pendigan (*pendimetalin*), Frontier Forte (*S- dimetenamid*), Agil 100 EC (*propaquizalofop*) and Gallant (*haloxifop-R- metil*) kills annual monocotyledons, but also some broadleaved weeds.

The treatments were applied with manual equipment, using a quantity of solution by 300 l/ha.

Determinations of weeds degree were made through the quantity, numbering and gravimetric methods on each experimental plot at 7, 14 and 28 days since treatment with herbicides and determine the efficacy of herbicides (%), uncontrolled weeds and the gain of weeds. The results were obtained using the variant analysis method.

Were cultivated hybrid Alex (2009) respectively NK Brio (2010).

RESULTS AND DISCUSSION

The infestation of sunflower crop with weeds it's made by different and complex factors, some of these it's changing year by year (precipitation, temperature, cultivar technologies) and other factors are constantly all the time (soil and his properties).

The period of experiment was characterized from precipitation point of view as an droughty year starting in spring 2009 at the establishment of crop and after the application of preemergent herbicides in May, comparative with year 2010 when the precipitation registered on all the vegetative period of crops were higher over multiannual average of the area with values between 10,6 mm and 57.1 mm (Fig. 1.).

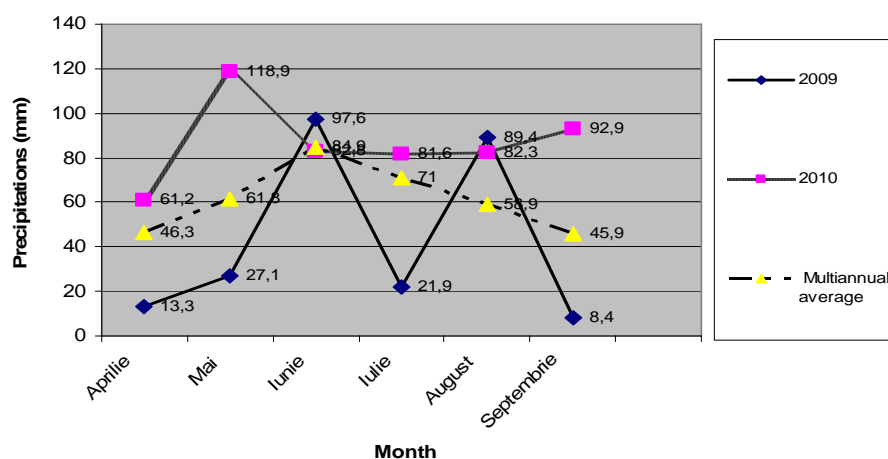


Fig.1. Monthly precipitation registered in vegetation period of sunflower crop at Oradea

Regarding to floristically structure it's noticed that 46% from the crop infestation it's assured by the annual monocotyledonous species *Echinochloa* 33%, *Setaria* 13%, 38% it's determine by annual dicotyledonous weeds over 10 plants /m² (*Amaranthus*, *Raphanus*, *Chenopodium*, *Polygonum* sp., *Xanthium*), 6% from this are under 2-3 plants /m² and 10% are perennial dicotyledonous species with 6-8 plants /m² (*Cirsium*, *Convolvulus*).

The most spreader weeds: *Echinochloa*, *Amaranthus*, *Raphanus*, *Chenopodium*, *Xanthium*, *Polygonum* and the perennial one like: *Cirsium*, *Sonchus*, *Convolvulus* are in the same time the most dangerous weeds both by an high relative number/m² by echeloned rising (*Xanthium*) and high waist of specimen (Fig. 2.).

The efficacy of herbicides expressed through infestation degree of weeds determined at 14 days since treatment was between 92% and 95%, respectively between 90-92% at 28 days since treatment, values obtained because some weeds vegetation had an advanced vegetation development at the moment of postemergent treatment application. (Table 1.).

For realizing a good efficacy in weeds control, the application of herbicides (Trophy, Pendigan, Frontier Forte) right away after sowing assure a very good efficacy for annual monocotyledonous species which are dominated and association with herbicides like: Linuron and Racer or Raft applied on vegetation which control the sensitive dicotyledonous species (*Amaranthus*, *Chenopodium*, *Raphanus*, *Polygonum*) obtaining an infestation degree over 90%.

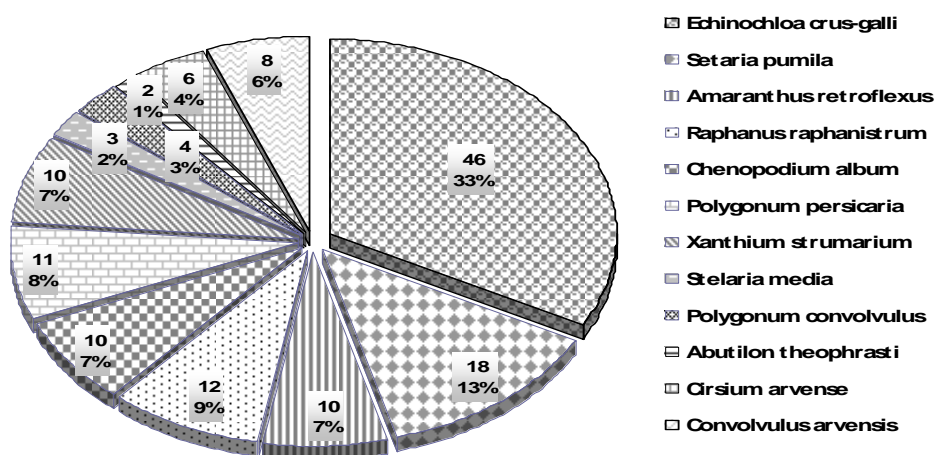


Fig.2. Floristically structure and weeds infestation degree in 2009-2010 period, Oradea

Table 1.

The efficacy and selectivity of herbicides applicated at sunflower crop,
Oradea 2009-2010

Herbicides	Rate l,kg/ha	Application time	Selectivity (NOTE EWRS *)		Efficacy %		Uncontrolled weeds (Bayer code)
			2009	2010	14 days	28 days	
1.Untreated	-	-	1	1	0	0	ECHCG, SETSP, AMARE, RAPRA, CHEAL, POLPE, XANST, CIRAR, CONAR, POLCO, STEME, ABUTE, CONAR
2.Trophy Super + Raft 400	1.75+1.5	Preem+postem	1	1	94	90	CIRAR, POLPE, XANST, CONAR
3. Pendigan + Linuron	4.0+2.0	Preem	1	1.8	95	92	CIRAR, CONAR, RAPRA
4. Frontier Forte + Racer	1.3 + 2.5	Preem	1	1.5	95	90	CIRAR, CONAR, XANST
5. Raft 400 + Agil	1..5+1.0	Postem	1	1	92	90	XANST, CIRAR, CONAR, POLPE
6. Goal 4F Gallant Super	0.5+0.8	Postem timp. + postem	1	1.8	92	90	CIRAR, CONAR, RAPRA, XANST reinfestat

NOTE EWRS: 1- Without phytotoxicity, 9 – Damaged plants 85- 100%

Also it can use with success the application of herbicides only on vegetation (postemergent) with compliance of optimum timing respectively when sunflower have 4-6 leaves (2-4 leaves in the case of herbicides Goal 4F), the annual grasses weeds had 2-4 leaves before twining and the dicotyledonous weeds had 2-4 leaves. The combination of herbicides: Raft 400 + Agil (1.5+1.0 l/ha), Goal 4 F + Gallant Super (0.5+0.8 l/ha) assure an infestation degree by 92% respectively 90% at 28 days since treatment.

For the uncontrolled weeds including perennial dicotyledonous weeds it's recommended minimum mechanical weeded out because in this way it can realize an efficient weed control to obtaining a higher level of yield.

Total biomass of weeds determined before harvesting it is about 1980 g/m² in the untreated variant respectively 110-138 g/m² in the case of herbicides analyzed, in negative correlation (very significantly) with yield (Fig. 3.).

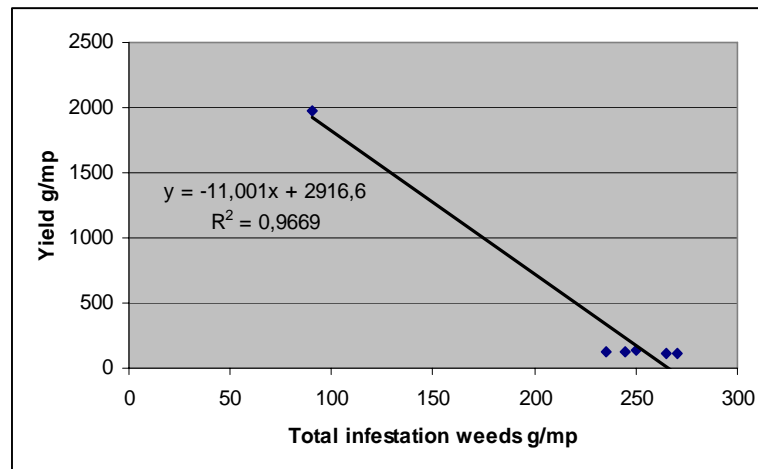


Fig. 3. The influence of weeds infestation on yield in sunflower crop, Oradea 2009-2010

CONCLUSIONS

- In the area of preluvosoils sunflower is infested in different stages every year, the problematic weeds like *Xanthium strumarium*, *Cirsium arvense*, *Convolvulus arvensis*, *Sonchus arvensis* will be always in this crops no matter what conditions are (draught or excess of rainfalls).

- The dominated weeds was the annual monocotyledonous species with a weight in the total infestation about 46% together with 38% annual dicotyledonous species with over 10 plants/m² (*Amaranthus retroflexus*, *Chenopodium*, *Papaver*, *Raphanum*, *Xanthium*) respectively 10% perennial dicotyledonous weeds (*Cirsium* , *Connvolvulus*).

- For a higher efficacy in weed control on the surfaces with sensitive mono and dicotyledonous weeds, the first treatment it is made preemergent for control of annual monocotyledonous species (Trophy Super, Pendigan, Frontier Forte) in association with herbicides like Linurex, Racer or postemergent with Raft 400.

- In infested plots with annual dicotyledonous and monocotyledonous weeds with dominated sensitive dicotyledonous species when sunflower have 4-6 leaves, the annual grasses weeds have 2-4 leaves (before twining) and the dicotyledonous species have 2-4 leaves will be using on vegetation (postemergent) associated herbicide like Raft 400 +Agil, Goal 4F + Gallant Super.

- Total quantity of weeds in untreated variant was about 1980 g/m² (dry substance) and after treatment using herbicides the quantity was reduced with 93-94%.

- The correlation between biomass of weeds and the sunflower yield is negative resulting that uncontrolled weeds biomass it is the one who determine the yield decreasing.

REFERENCES

1. Berca M., Fritea T., Pogacianu M., Popescu A., Vladutu I., 2000, Repartition géographique des populations des mauvaises herbes en Roumanie – Xith International Conference on Weed biology – Dijon, France, pp. 221-228.
2. C.K. Woon, 2008, Selective Postemergence Herbicides for Grass Control in Sunflower (*Helianthus annuus* L.) Journal of Agronomy and Crop Science Volume 157, Issue 3, pages 181–186
3. Vischetti C., Marucchini C., Leita L., Cantone P., Danuso F. and Giovanardi R., 2002 , Behaviour of two sunflower herbicides (*metobromuron*, *acetonifin*) in soil. European Journal of Agronomy, Volume 16, Issue 3, April 2002, Pages 231-238
4. Floarea Bodescu, Negrila E., Alexandrina Popescu, 2000, Cercetări privind perfectionarea măsurilor de combatere a buruiinilor din cultura de floarea soarelui în Câmpia Burnaşului. Al XII-lea Simpozion Național de Herbologie, Sinaia. pp. 235-240
5. Hunyadi Borbely, É., Lesznyak M., 2006, Investigating yield and phenological stages of sunflower varieties in agro-ecological environment. Cereal Research Communications 34(1) 417–420.
6. Lehoczky É., Buzsáki K., 2005, Herbicidek hatása különböző repcefajták növekedésére és tápanyagfelvételére. Magyar Gyomkutatás és Technológia, 6(1): 39–52.
7. Lehoczki É., Pardi J., Szalat T., Dobozi M., 2002, Effect of pre-emergent herbicides on the growth of sunflower varieties. Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz, Sonderheft, XVIII. 937–941.
8. Popescu A., 1996, Efficacy of application of new simple and combined herbicide treatments in controlling the annual weeds from sunflower crops in Romania. Proc. 14th International Sunflower Conferences, Beijing/ Sheniang, China, Vol. I. 499-504
9. Tanaka D.L., Anderson R.L., 1998, Cultural weeds control systems for sunflower. Proc. 20th Sunflower Research Workshop, NSA, January 15-16, Fargo NP, pp. 9-15.
10. Zuza V.S., 1995, Weed control in sunflower crops. Zascita Rastenii, Moskva, No.5, 31.