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Survey the Effect of Cover Crops in Reduced Sunflower Weed Biomass

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ABSTRACT

In order to evaluate the effects of cover crops on reduced weed biomass in hybrid sunflower an experiment was carried in the research stations, Natural Resources Medicinal Plants (Samian_Ardabile) with 3 replicates in 1390-1391. The first factor was considered three type of cover crops, winter rye, spring barley, winter wheat with 2 control treatment, second factor was mulch management at two levels (living mulch, dead mulch) and the third factor was two cover crops planting date (synchronic with sunflower planting, 45 days after). Results showed interaction (cover crop×planting date), had a significant influence on annual weed biomass. *Convolvulus arvensis* biomass was influenced by cover crops at level probability of 1 %, also *hragmitesaustralis* biomass was influenced by cover crops and planting dates. Simultaneous planting dates, cover crops with a sunflower had greater role rather than 45 days late in reducing weed biomass. Then the control 1 was found at wheat cover crop treatment, the maximum seed dry weight with average of 176/49 gram per square meter.

Key words: Weeds, Cover crops, Planting date

INTRODUCTION

Sunflower, after soybean, canola and peanut is the fourth annual crop in the world, that is grown for its edible oil. In Iran, it is also considered as one of most important oilseed crops that has allocated the largest share of production to itself after cotton and soybean. A significant portion of sunflower seed is used in other industries in addition the preparation of oil (Golineghad et al, 2008). Considering that much of the oil requirements of the country is supplied by foreign, increasing the production of oilseeds such as sunflower in the country is most important and it Can have an important role in supply of wanted oil in the country (Weiss, 2000). This plant because of its wide adaptability and owning (having) a highest seed oil (40 to 50%), is considered as a most important oilseed crop and it is oil seed has a high quality (Scheiner et al, 2002). Although, weeds are included only 1 percentage of plants in the world, but may be cause severe economic damage. It has been reported that weeds sometimes cause 100% damage to crops (singh et al, 2006). The results of a study show, That if a blend (mixture) population of annual weeds allowed growing with sunflower, seed yield will be decreased about 13% per each 10% increase in weed biomass (Van Gessel and Renner, 2000).Today, weeds control is associated with highly advanced

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technology and accurate recognition of plant, soil and crop management systems and many environmental parameters that are associated with weeds control operations (Kuchaki et al, 2001). Cover crops can be used as an important component of the weeds control in the agricultural systems. Placing the hibernal cover crops in the crop rotations can be effective in the hibernal and vernal weeds control (Creamer and Baldwin, 2000). Cover crops can affect the weeds, either in the form of alive or plant debris after removing the cover crop. Different stages in the life of weeds will be affected by different mechanisms, either during period of cover crop is activity in it is live phase or after removing (Teasdale et al, 2007). The living mulch can contribute to suppress the weeds, reduce the soil erosion, increase the soil fertility and improve the water penetration (Sullivan, 2003). Although present data (information) represent the considerable role of cover crops in weeds management, their prolonged role and pressure on weeds isn't known properly. This test was carried out for determining a best cover crop, the management of herbal mulch and it's planting time in sunflower fields and improve the yield of seed.

MATERIALS ANDMETHODS

This survey was carried out in Natural Resources Research Station, Samian's botanicals located at 15 km from Ardabil- Meshkin Shahr road with such geographic coordinates : altitude (48 and 15 minutes), altitude (38 and 23 minutes) , with cold semi- arid climatic conditions (bused on Ambzheh) and with 7.5 - 8 pH in the soil . The experiment was conducted in the form of factorial in a randomized complete block design with three replications. The first factor consists of three different types of autumnal type rye cover crop, vernal type barley, autumnal type wheat along with 2 control treatment (1: without cover crops and with weeding the weeds, 2: without cover crops and without the weeding). The second factor was considered as mulch management in two levels (living mulch, dead mulch) and third factor also considered as the planting time of cover crops in two dates (contemporary with sunflower cultivation, 45 days after it). Sunflower seeding was done manually on the spacing ridges and 50 cm row and with 25cm spacing between bushes and on depth about 5cm. The seeds of rye cover crops, barley and wheat were planted between the rows of sunflower cultivation. Sampling of the weeds due to low density of the weed was done in a rotation with the quadrate 0.5×0.5 m^2 randomly from each plot. After taking samples were placed in individual nylon and were transported to the laboratory immediately. In the lab, after determining the type of available weeds (with narrow leaves, deciduous, annual, perennial) their weight were weighed with a sensitive microbalance with accuracy of 0.001 grams. For taking samples from sunflowers, the sampling was done from each plot per unit of half a square meter area, before the final maturation. And it was extended to a square meter unit. Data analysis was performed by SAS software and the data mean was also compared using Duncan's multi- amplitude test. The relative curves were plotted in Excel software.

RESULTS AND DISCUSSION

The results from the variance analysis (Table 1) showed that biomass of *Echium italicum and Salsola Kali* weeds (annual weeds), respectively at 1% and 5% probability level affected by interaction (cover crops × planting date). Biomass of *Convolvulus arvensis* affected by cover crops at a probability level about 1% and biomass *Phragmites australis* at 1% probability level affects cover crops and at the 5% level was affects planting date.Grain dry weight at the 5% level in the three-way interaction (cover crops × management × planting date) showed significant differences. According to table (2) the maximum biomass of weeds, *Convolvulus arvensis* and *Echium italicum* and *Salsola Kali* was obtained with the rate of 136/64, 195/48, 28/52 $g*m^2$ in the control treatment 2. Every three cover crops had a similar effect in reducing biomass of *Convolvulus arvensis.* And were observed in the same group together. The minimum biomass for *Echium italicum* weed after the control treatment (1) (without cover crops with a complete weeding) was observed in the same group with rye and barely in their treatment. The maximum biomass *Echium italicum* was also related to the control treatment (2). Simultaneous planting of cover crop with sunflower could reduce the biomass of *Echium italicum* effectively than 45 days later. The minimum

biomass of *Salsola Kali* in barely treatment were obtained in common group with rye and wheat treatments and maximum biomass of *Salsola Kali* in the control treatment (2) were obtained. The minimum weight of *Phragmites australis* in the control treatment (1) was obtained with significant difference than other treatments, Among other treatments was not found a significant difference. Date of simultaneous planting of cover crops with sunflower reduced the *Phragmites australis* biomass from 16gr to 4gr than 45 days later. The maximum grain dry weight was obtained in the control treatment (1) at the group common with wheat cover crops. Rye and barely were also placed in the same group and showed a more effective role in increasing grain dry weight. There was no significant difference among levels of management. There are many reports about weeds control by cover crops. Weeds control by cover crops may be performed through competition for resources such as light, water, nutrients, allelopathy, occupying the growth space of weed or a combination of these factors (Lampkin, 1994). The types of millet species as cover crops recommend for control the hibernal weeds that cause some problems in the beginning of spring and the vernal species can be used to preserve from germination and growth of other weeds always germinate in the spring (Singh et al, 2003). The results of experiments by Abdollahian-Noghabi et al (2011) about the sugar beet cultivation showed that cover crops planting such as triticale.wheat. rye and barely influence on the similar weed population when a herbicide used to control plants. Living cover crops can reduce the rate of light and also available moisture for germination of weeds seed. Moreover, some weeds that grow in the curtain of cover crops, affected by competition and For survival are not well developed. The remnant of cover crops also change the severity of weed germination or re-growth of weeds through changes in temperature and soil moisture, releasing the allelopathic compounds and impressing on soil structure (Globe and Culige, 2008). Positive effect of cover crop on the performance of crops has also been reported in the experiments of other researchers (Kuchaki et al, 2001).

Table 1- Analysis of variance weed biomass and seed dry weight affected by different levels of cover crops, management and cover crop planting date

		Meansof squares				
Treatment	**DF**	*Convolvulus arvensis*	*Echium italicum*	*Salsola Kali*	*Phragmites australis*	seed dry weight
Replication	2	0.21**	0.31*	0.35**	0.14ns	16342.22**
Cover crops (A)	4	1.13**	0.72**	0.52**	0.28**	2210.93**
Management(B)	1	0.016ns	0.028ns	0.028ns	0.017ns	148.11ns
Planting date (C)	1	0.0086ns	2.77**	0.24*	0.25*	1363.55ns
Interaction(A×B)	4	0.024ns	0.037ns	0.0094ns	0.015ns	282.19ns
Interaction(A×C)	4	0.024ns	0.49**	0.12*	0.10ns	697.99ns
Interaction(B×C)	1	0.044ns	0.028ns	0.028ns	0.002ns	3981.27*
Interaction(A×B×C)	4	0.061ns	0.037ns	0.0094ns	0.024ns	1312.12*
Error	38	0.037	0.085	0.051	0.074	541.98
Coefficient of variation (%)	-	16.7	27.63	26.011	28.06	14.045

Significant at 0/01, * significant at 0/05, ns no significant**

Table 2- means comparison weed biomass and seed dry weight affected by different levels of cover crops, management and cover crops planting date Means with similar letter did not show significant differences

	Treatments	*Convolvulus arvensis*	*Echium italicum*	*Salsola Kali*	*Phragmites australis*	See dry weight
	control (with weeding)	1.00b	1.00c	1.00c	1.00b	183.52a
	Control (Without weeding)	136.64a	195.48a	28.52a	12.36a	151.50c
Cover crops	rye	10.27b	27.81bc	14.78b	16.24a	159.46bc
	barley	30.99b	59.0bc	1.09c	12.63a	157.79bc
	wheat	19.90b	87.43b	6.63bc	11.72a	176.49ab
	living mulch	39.35a	69.94a	12.29a	12.37a	167.32a
Management	dead mulch	40.18a	78.34a	8.51a	9.21a	164.18a
	Simultaneous with cultivation sunflower	35.55a	90.39b	6.5a	4.93b	160.98a
Planting date	45 days after	43.97a	108.39a	14.3a	16.65a	170.52a

CONCLUSION

The results of this experiment showed that cover crops have an effective role in reducing the biomass of weeds, especially the annual weeds. So that the use of cover crops has caused an increase in the yield of sunflower seed. So using the cover crops among planting rows, the crops can be considered as an option to replace the herbicides and conventional tillage and a new and appropriate approach in sustainable management of weeds.

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