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Effect of weeding and by Forage and Medicinal plants as Companion Crops on Some of quality traits of Corn (Zea mays)

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ABSTRACT: In order to study the effect of weeding and by forage and medicinal plants as companion crops on some of quality traits of corn, an experiment was conducted with corn and cover crops at Agricultural Research Station of University of Tabriz in 2011, The experimental design was randomized complete block with 3 replications and 10 treatments. The treatments included synchronic cultivation of clover and corn, clover cultivation 15 days after corn cultivation, synchronic cultivation of hairy vetch and corn, hairy vetch cultivation 15 days after corn cultivation, cultivation of basil and corn, basil cultivation 15 days after corn cultivation, synchronic cultivation of dill and corn, dill cultivation 15 days after corn cultivation, corn with weeding, corn with weeding and weedy plots. The 8 treatments of these 10 treatments were based on a 4×2 factorial randomized complete block form, four types were and by forage and medicinal plants as companion crops (clover, hairy vetch, basil and dill) and two cultivation time (synchronic cultivation and cultivation 15 days after). It has been shown that the corn weed control, treatment has oil present, protein present, fiber present and starch present to other treatments. Among companion crops, the cultivation of clover with corn had highest amount in all traits compared to other treatments. Also, synchronic cultivation companion crops with corn relation to cultivation 15 days after corn cultivation all traits had a high remain.

***Keywords*:** basil, clover, hairy vetch and weedy

INTRODUCTION

Grass weeds including biological limiting factors are the different ways that reduce crop yields. Weeds, weed species, weed density and weed biomass are very effective on crop yield loss (Blackshaw et al., 2002). Depending on the density, species composition, a relative time of emergence, weather conditions, crop plant varieties, grass weeds in corn and other issues, damage will vary. Although maize is not weak against other crops competing grass weeds, however, there is an urgent need to control grass weeds (Williams et al., 2008). Multi-culture, such as companion culture and the mixed cultures are together as an integrated weed management strategies weeds with less impact on the environment with the chemical herbicide. Weed infestations, causes severe reductions in crop yield and in condition of pure corn culture, corn losses of 60-40 percent have been reported (Thobatsi, 2009). In the absence of herbicides to control weeds depending on the density and diversity of weeds and grass, corn yield may be reduced 15 to 90% (Thobatsi, 2009; At Rajken and Soanton, 2001) stated that in competition for corn and weeds, limitation of resources takes place. Despite the tight control of grass weeds in most farming systems, about 10% of the annual agricultural production destroys because of the competition of the weeds among the grass in the

world without controlling weeds, yield losses depending on the competitive ability of crop density and duration of competition varies from 10 to 100 percent. Therefore, management of weeds is one of key operations in more agricultural systems (Rajcan et al., 2001). However, the use of chemical herbicides is one of the major factors to increase agricultural production in the past two decades 2001, but increased herbicide resistant weeds to use the chemicals materials is necessary to reduce the cost of agricultural inputs and global concern in relation the environmental impact, reducing the use of them is essential (Kropff, 1993). Clover may be through competition (Medicago sativa) for resources like light, water, nutrients, allopath, weed growth or space or a combination of these factors by companion crops and cover plants like alfalfa (Lampkin, 1994). In many regions accepting culture of plants together as a piece of habitat management of culture systems has proved that these cultivations could have special benefits in terms of degree of variety in time and space (Banik et al., 2006; Lithourgidis et al., 2006). Many researchers have reported about the positive effects of using companion or mixed culture, compared to pure culture even under mechanized conditions (Helenius, 1990). Weed Suppress and reduction of weed growth on crop interaction as determinants of performance excellence intercropping is considered adding the second specie of cultivation plant to pure culture will vary biomass among species in weeds (Poggio, 2005). Yield decrease, reduction of sickness and weeds, grassing the fertilization of soil and conservation of soil are the most important benefits of use of companion culture and mixed culture and generally these type of farming operation helps to relieve the pressure of the weed (Jensen, 1996 and Baumann et al., 2001). Due to resistance of pest and herbicide in weeds of chemicals in agriculture, human beings seek alternative methods of pest and weed management (Bulson et al., 1997). Despite prevailing system of mixed cropping, researchers have shown little attention to control weeds. It is proved that mixed culture compared to mono culture has showed lots of benefits (Liebman, 1986). The object of this study was for the reason the production of corn in Iran is creasing and also comparison effects of weeding and not weeding by companion crops on some of quality traits of corn (SC 504) In climatic conditions in Tabriz.

MATERIALS AND METHODS

This study was carried out in spring of 2011 in Farming Research Station, University of Tabriz, located in the East of Tabriz (Karkaraj Land). Mean minimum and maximum annual temperatures over a period have been reported, respectively, 2.2, 10 and 16 degrees and the average annual rainfall are equal to 271.3. Altitude of 1360 meters above sea level in the region and its geographic latitude and 46°17' E and 38°05' N, respectively. The experiment was carried out with eight treatments (including synchronic planting of the corn and red clover, red clover grown for 15 days after planting, synchronic planting of the corn and vetch, planting of the corn and vetch, culture of vetch 15 days after, co culture of maize and basil, culture of basil 15 days after planting, synchronic culture of corn and dill, culture of dill 15 days after planting) with three replications in factorial design in a randomized complete block design. These eight treatments are in a 4×2 factorial form that the four plants each were grown in two different dates. Each plot size was 4×3 m, so that consisted of five rows on each row, double row of corn plants with one of companion crops in specified sowing date (synchronic with the maize planting and 15 days after that day). The distance between adjacent plot one meter and planting distance between rows 50 cm was considered. Aggregation of plant corn, red clover, vetch, basil and dill, were respectively, 8, 100, 75, 38 and 30 plants per square meter. Varieties used in the middle of a genotype SC 504 corn. Studying traits including oil present, protein present, fiber present, starch present, biological yield and green yield. Biomass was determined for each treatment in each replication. Then a certain amount of seeds were transferred to the laboratory to check the quality traits were determined and percentages. Grain yield in time of growing of corn, by hand picking of corn in two row of each plant were measured after removing margin of them and removing grain from corn by kg/ha with humidness of 14%. Also the common were weeds of grass biomass in a field Amaranthus retroflexeus, Convolvulus arvensis, Acroptilon repens, Cuscuta sp. Analysis of data of test after normality test, homogeneity of variance and non-additive effects of repetition and treatments in a randomized complete block design with factorial design based on data obtained from the measured traits analyzed by MSTAT.C and SPSS software and mean comparisons were obtained by Duncan and drawing diagrams were performed with Excel software.

RESULTS AND DISCUSSION

Oil %

The seed oil, corn plants and the significant effect of sowing date on yield was observed (Table 1). According to Table 2 there is a significant difference between treatments, so that most of weeding out the corn (4.59%) and

the lowest amount of corn without weeding (3.22 percent).corn plants with a delay of 15 days, the plants with higher average corn yield (Tables 3 and 4). In this experiment, the reduction of quality bakery ingredients in some treatments, the effect of weed competition with corn on the environment resources. (Parak et al., 1989)reported that increased competition between domestic crop seed constituents such as starch and protein percentage decreased.

Table 1. Analysis of variance of field traits

Mean square					
Fiber present (%)	Protein present (%)	Starch present (%)	Oil present (%)	df	S.O.V
0.005^{ns}	0.15^{ns}	^{ns} 0.155	**0.12	2	Replication
**0.109	**21.28	**10.39	**14.2	3	Companion crops
*0.016	**20.40	**7.11	**1.75	1	Sowing date
0.109^{ns}	0.33^{ns}	^{ns} 0.057	0.24^{ns}	3	Time×Companion crops
0.05	0.44	0.268	0.35	14	Error
3.4	4.7	5.2	6.6	_	CV (%)

ns, * and ** are no significant and significant at 5 and 1 % probability levels, respectively.

Table 2. Means of traits yield and yield components of corn on all treatment.

Fiber present (%)	Protein present (%)	Starch present (%)	Oil present (%)	Treatment
3.25 ^{b}	4.22 ^{b}	72.90 ^{b}	4.42^{b}	Cultivation synchronic corn with clover
3.23 ^{bc}	4.17^{c}	72.45 ^{b}	4.40^{b}	Cultivation clover 15 days after corn
3.20 ^{c}	4.15 ^{c}	71.74 ^{b}	4.36 ^{c}	Cultivation synchronic corn with vetch
3.21 ^{c}	4.09 ^{cd}	68.12 ^{c}	4.25 ^{d}	Cultivation vetch 15 days after corn
3.19 ^{c}	3.98 ^{d}	67.61^{c}	4.21 ^{d}	Cultivation synchronic corn with basil
3.20 ^{c}	3.88 ^{d}	65.29 ^{d}	4.15 ^{e}	Cultivation basil 15 days after corn
3.14 ^{d}	3.83 ^{d}	65.12 ^{d}	4.11 ^{e}	Cultivation synchronic corn with dill
3..07 ^{e}	3.75^{de}	63.59 ^{de}	4.04 ^{e}	Cultivation dill 15 days after corn
3.51 ^{a}	4.47 ^{a}	74.65 ^{a}	4.56 ^{a}	Control weed corn
3.01 ^{f}	3.56 ^{e}	60.71 ^{f}	3.22 ^{f}	Non control weed corn

Means in each Colum, followed by at least one similar letter are not significantly different level using Duncan‘s Multiple Range test

Table 3. Means of traits yield and yield components of corn effect by companion crops

Fiber present (%)	Protein present (%)	Starch present (%)	Oil present (%)	Treatment
3.24 ^{a}	4.18 ^{a}	72.60 ^{a}	4.39 ^{a}	Cover-Clover
3. 20 ^{b}	4. 08 ^{b}	69.75 ^{b}	4.32 ^{b}	Cover-Hairy Vetch
3. 19 ^{b}	3.95 ^{c}	65.75 ^{c}	4.22 ^{c}	Cover-Basil
3.10 ^{c}	3.80 ^{d}	62.55 ^{d}	4.09 ^{d}	Cover-Dill

Means in each Colum, followed by at least one similar letter are not significantly different level using Duncan‘s Multiple Range test

Table 4. Means of traits yield and yield components of corn in times synchronic and 15 days after corn cultivation

Fiber present (%)	Protein present (%)	Starch present (%)	Oil present (%)	Treatment
3.20 [a]	4.01 [a]	69.35 [a]	4.28 [a]	Cultivation synchronic
3.17 [b]	3.97 [b]	67.36 [b]	4.20 [b]	Cultivation 15 days after

Means in each Colum, followed by at least one similar letter are not significantly different level using Duncan's Multiple Range test

Starch %

Seeds were not significant (Table 1). Comparison between the average plants showed that corn starch, corn and clover treatments had higher mean (72.60%) compared to other treatments (Table 3). The co-culture showed a higher average yield (Table 4). According to Table 2 between treatments existed, so that most of the starch grains of corn with weeding, average 74.65% and the lowest corn without weeding, average was 60.71 cm. Cost (Haz, 2002), reported an increase in output and intraspecific competition (increased density), percent starch grains and consequently reduce corn yield will be reduced. It also analyzes the correlation table (Table 5) indicated that this trait with biological yield and grain yield had significant positive correlation the results of this study(Behzad ,2008) is consistent.

Protein %

The table analysis 1 of shows the protein significantly affects corn forage crops and planting times they were but the interaction between these factors was not significant. Between forage and medicinal plants at different times, there were significant differences (Tables 3 and 4). According to Table 2, significant difference between treatments in terms of protein content was observed, so that the highest percentage of corn with weeding (4.47%) and the lowest corn without weeding (3.56%) Reduction in total protein content and grain quality traits can be attributed to the interference of weeds because the weeds compete with the crop species is the output of. Significant relationship between protein and grain percentage yield.

Table 5. Correlations of tarts.

Starch present	Protein present	Oil present	Fiber present	Grain yield	Biological yield	
					1	Biological yield
				1	**0.92	Grain yield
			1	**0.82	**0.69	Fiber present
		1	0.18^{ns}	*0.13	**0.11	Oil present
	1	0.17^{ns}	0.15^{ns}	0.10^{ns}	**0.21	Protein present
1	0.20^{ns}	0.26^{ns}	0.24^{ns}	**0.22	**0.38	Starch present

ns, * and ** are no significant and significant at 5 and 1 % probability levels, respectively

Crude fiber %

Given the significant differences between treatments can be seen in Table 2, so that the highest percentage of crude fiber in maize weeding treatments (3.51%) and the lowest amount of corn without weeding (3.01%) was. The crude fiber, no significant effect between plants and planting dates on yield was observed (Table 1).Along with plants), this trait had a higher mean percentage (Tables 3 and 4). In this experiment, the reduction of quality bakery ingredients in some treatments, there were more weeds. (Zarrinabadi and Ehsanzadeh, 2003) reported that the amount of fiber and dry under ambient conditions and can be genetic. Correlation analysis showed that the crude fiber grain yield was positively correlated with biological yield and grain yield (Table 5), with the findings that (Behzad, 2008) is consistent.

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