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Effects of Nitrogen Application Method and Weed Control on Corn Yield and Yield Components

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Abstract: The effects of nitrogen fertilizer application and different methods for weed control on yield and yield components of corn was evaluated in Khorramabad in 2011. The experiment was conducted as a split plot based on randomized complete block design in 3 replications. Nitrogen application was as main plot in 4 levels (no nitrogen, broadcasting nitrogen, banding nitrogen and sprayed nitrogen) and methods of weed control were in 4 levels (non-control weeds, application Equip herbicide, once hand control of weeds and application Equip herbicide+once time weeding) was as subplots. Result illustrated that effects of nitrogen fertilizer application were significant on grain and forage yield, 100 seeds weight, harvest index, grain number per row and cob weight per plant. Grain yield increased by 91.4 and 3.9% in application banding and broadcasting for nitrogen fertilizer, respectively, compared to the no fertilizer treatment. The results show improved efficiency of nitrogen utilization by banding application. Grain yield, harvest index, seed rows per cob, seeds per row and cob weight were increased by weed control. In the application of Equip herbicide+ hand weeding treatment corn grain yield was increased 126% in comparison to weedy control. It represents of the intense affects of weed competition with corn. The highest corn grain yield (6758 kg h^{-1}) was related to the application banding of nitrogen fertilizer and Equip herbicide+once hand weeding.

Key words: Grain yield, equip, Khorramabad, competition

INTRODUCTION

In the whole agro ecosystems, weeds had existence as unwanted plant that control of them is necessary. The competition between weeds and corn for moisture, light, nutrients during the growth season is induced reducing the quality and quantity of corn yield (Tamado and Milberg, 2000). Although the corn is high and powerful crop but is sensitive to competition with the weed and reduction of yield has been reported over 30% (Ellis *et al*., 2003). Since the weeds are adapted to conditions, they are successful to completion and reducing the yield (Ciuberkis *et al*., 2007). Amount of the yield reduction is depend to corn variety, weed species, density and growth season (Harzler *et al*., 2004). *Purtolaca oleracea*, *Amaranthus retroflexus*, *Convolvulus arvensis*, *Chenopoodium album*, *Echinocloa crus-gali*, *Cyperus* sp., *Abutilon theophrasti* and *Sorghum halepens* are most important weed in the corn farms. Weed control in corn farms need to appropriate management operations (Ferrell *et al*., 2009).

To prevent the growth of the weeds in corn, cultural control like no tillage, narrow rows and rotation has been suggested but herbicides has been one of the more important methods in wee management (Schuster *et al*., 2007). Rimsulforon and foramsulforon (equip) as herbicide which have been advised to control of the weeds (Lemieux *et al*., 2003). Equip is a post emergence and selective herbicide in corn from sulfonylurea. Use from herbicide in despite of good control of weeds, accompanied by some perils. Chemical control has not been the unique and best way to manage the weeds and it reduce the sustainability of agro ecosystems. Although developing the herbicides, reduce the pressures caused by the weeds, but by developing rapidly the weed resistance to herbicides and increasing the environmental concerns and its high cost, today need to new and more immune techniques for crop production (Rajcan and Swanton, 2001). Fertilizer management is one of the operations which has got effect on interference between crops and weeds. The amount of nitrogen into the soil can effect on competition between weeds and crops (Blackshaw and Brandt, 2008). Term of time, place and the type of fertilizer can be important tool in the IWM (Cathcart *et al*., 2004). Nitrogen management is influential over weed competition (Harbur and Owen, 2004). The method of fertilizer distribution would be effective on competition. Nitrogen fertilizer which as striped placed

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into soil surface reduced the competitive capability of *Bromus tectorum*, *Hordeum jubatum*, *Agilops cylindrica* and *Avena fatua* (Blackshaw *et al*., 2004).

Today, experts of weed science have mooted the philosophy of weed management by keep the weed growth in acceptable level in terms of economic, cultural and ecological that is basic aim to shift the relationship between crops and weeds profited by crops (Radosevich *et al*., 1997).

Notice from dangers of herbicide utility has been encouraged the producer towards reduction of using pesticides which is useful terms of economic and ecological and that has led them by changing the management methods towards IWM based on the ecological principles (Mennan *et al*., 2006). In generally, it results the integrated management is one of the best ways in controlling weed in comparison with other ways, so that in this way while reduction competition and elimination the weeds resistance to herbicides, also it cause to sustainability of environment (Lorzadeh *et al*., 2010).

The aim of this study is assessment of different methods of applying nitrogen fertilizer in corn and studying techniques to control of weeds toward reduction of their problems in corn farms in Khorramabad.

MATERIALS AND METHODS

The study was conducted at the research site of SARAB-E-CHANGAEE in south west of Khorramabad in 2011.

A randomized complete-block design as split plots with three replications was used in experiments. The mail plot is applying nitrogen fertilizer (in four level: 1-non nitrogen fertilizer, 2-superficial distribution of nitrogen, 3-the linear application of nitrogen, 4-Sprinkling of nitrogen fertilizer) and subplot is weed management (in four level: 1-control treatment, 2-application of equip herbicide 2 L ha^{-1}, 3-application of equip herbicide+weeding, 4-one stage weeding).

Single cross variety of corn was planted (a middle matured cultivar) in 75 cm row and 20 cm over row. The method of nitrogen application was in accordance to 200 kg h^{-1} urea thus in treatment of superficial distribution of nitrogen fertilizer, was dispersed on the plot surface 2 h before irrigation. Sprinkling was done in three stage (early the growth, Rise of reproductive organs, corn flowering) with 10% urea solution and linear application was done in two line around the corn rows. The treatment of weeding was done early the corn growth stage. Applying of herbicide in 6-8 leaves stage of corn and applying herbicide+weeding (3-4 leaves stage of corn) was carried out. At the end of the growth stage, 15 days before final harvest of corn, 10 corn plant by omitting margin effect from mid of plot were harvested and put on the oven to drying.

After drying all plant components, samples were sent out and was measured the dry weight of stalks and corn ear. In the next phase the number of the grain row in ear corn, length of corn ear and diameter of corn ear were measured and recorded. To determine the hundred grain weight, grains of corn ear in per plot was separated and was measured. Finally the weight of corn ear was determined. With use from achieved data, some characteristic like grain yield, biologic yield and harvest index was measured. To determine the foliage yield, with omitting the edge effect of plots, remained segment of plots was harvested from the ground surface and after the scaling of corn plant with ears per plot in the farm was calculated.

Statistical analysis by using Mstatc software to test and compare the based on Duncan test took place at the 5% level. Use from Excel to drew the graphs.

RESULTS AND DISCUSSION

Grains yield: The effect of nitrogen fertilizer application on grain yield of corn was significant at 1% (Table 1). The most grain yield (7439 kg h^{-1}) was related to the linear application of nitrogen fertilizer and its least was related to control treatment (non-application of nitrogen fertilizer). The linear application of nitrogen caused increase grain yield to 91.4, 84 and 50.5%, respectively as compared to non-application, superficial distribution and sprinkling. This results shown that the nitrogen in the linear application has optimum usage.

Nitrogen is important for crops, but the method of fertilization can also affect the amount of it which absorbed by crops. Chaab *et al*. (2009) observed that linear application as the most efficient and is optimum method in distribution of fertilizer in corn. Anderson *et al*. (1998) had believed that the method and time of using nitrogen is influencing efficiency of applying it. Zimdahl (1988) due to an experiment found out that some weeds absorbs the chemical fertilizer faster and in a more amount than crops which itself cause reducing capability of absorption for the crops, that it would draw a conclusion to reduction of grain yield in superficial distribution as compared with sprinkling has been the more usage of weed from nitrogen and has increased its own competitive ability (Table 2).

The grain yield of corn was significant by weed management at 1% (Table 1). The treatment of application of herbicide with one stage weeding caused the increase

of grain yield to 126.5% to non-control of weeds. Increase of grain yield in herbicide application with one stage weeding to weeding was 47.5 and 12.9%, respectively. Many researches has indicated that non-controlling of weeds might reduce corn yield remarkably during its growth season. The completion between weed and corn on moisture, light and nutrients be caused the reduction of quality and quantity of yield (Tamado and Milberg, 2000). And the amount of reducing yield is dependent to cultivar, weed species, density and time of the growth stage of weed based on the growth circle of plant life (Ellis *et al*., 2003; Harzler *et al*., 2004). Based on Dunan *et al*. (1999) reports, corn need essentially to control of weed in time and if were controlled late, they shall reduce the yield in accordance with the number and weed species from 15-100% (Table 2). Interaction effect of nitrogen application and weed management was significant on corn grain yield in 5% (Table 1). High average of grain yield was perceived in linear application with weed management. The least amount of grain yield was perceived in non-nitrogen application in presence of weed interference (2000 kg h^{-1}) (Table 3).

Fodder yield: The results shown that foliage yield in influenced by nitrogen application was significant in 5% (Table 1). Maximum foliage yield is related to linear application and least's of it was related to non-application, so that using the linear application cause the increase of 24.26% foliage yield in comparison with non-nitrogen application, whilst the linear application was increased foliage yield in comparison with sprinkling (13.8%) and superficial distribution (11.6%) (Table 2). The effect of weed management on corn foliage yield was not significant. The result of comparison of means shown that treatment of weed management had been placed in one group and they had better operation to non-control of weeds, so that the utilization of herbicide caused the increase 26.2% in foliage yield to 15.8-15.2% as compared

Table 1: Analysis of variance of grain yield, fodder yield, 100-seed weight and grain/cob ratio

		Mean Square			
Source	df	Grain yield	Fodder yield	100-Seed weight	Grain/cob ratio
Replication	2	317808.296	721959220.799	6.7060	0.370
Application method	3	3234486.863**	216774530.868*	58.2790**	134.227**
Error	6	1959710.340	43963145.483	2.2710	42.213
Weed control	3	33121730.370**	132877030.259$^{n.s}$	29.296$^{n.s}$	335.707**
Application× weed control	9	1862478.760*	78711355.099$^{n.s}$	7.696$^{n.s}$	80.887**
Error	24	746913.887	67420774.739	13.2970	16.929
Coefficient of variation (%)		17.02	17.380	11.5000	6.000

ns, *,**Non-significant, significant difference at 5 and 1% level of probability

Table 2: Effects of nitrogen application method and weed control on grain yield, fodder yield, 100-seed weight and grain/cob ratio

Factor	Levels	Grain yield (kg h^{-1})	Fodder yield (kg h^{-1})	100-seed weight (g)	Grain/cob ratio (%)
Nitrogen application	No nitrogen	3886^{b}	42470^{b}	29.51^{b}	66.77^{b}
	Broadcasting nitrogen	4042^{b}	47310^{ab}	33.93^{a}	68.45^{ab}
	Banding nitrogen	7439^{a}	52780^{a}	33.25^{a}	72.93^{a}
	Sprayed nitrogen	4944^{b}	46390^{b}	30.16^{b}	68.23^{ab}
Weed control	Non-control	2983^{d}	42250^{b}	29.56^{b}	61.15^{c}
	Equip herbicide	5986^{b}	49100^{a}	32.19^{ab}	70.69^{ab}
	Once time weeding	4583^{c}	48670^{a}	33.28^{a}	69.05^{b}
	Equip+once time weeding	6758^{a}	48920^{a}	31.83^{ab}	73.48^{a}

In column, means with the same letter are not significantly different at 5% level using Duncan's test

Table 3: Interaction effects of nitrogen application method and weed control on grain yield, fodder yield, 100-seed weight and grain/cob ratio

Factor	Levels	Grain yield (kg h^{-1})	Fodder yield (kg h^{-1})	100-seed weight (g)	Grain/cob ratio (%)
No nitrogen	Non-control	2000^{g}	35580^{d}	29.17^{b}	46.63^{e}
	Equip herbicide	4833^{e}	43060^{bcd}	29.03^{b}	69.17^{abc}
	Once time weeding	4067^{ef}	43500^{bcd}	29.7^{b}	68.83^{abc}
	Equip+once time weeding	4933de	43720^{bcd}	30.13^{b}	73.43^{ab}
Broadcasting nitrogen	Non-control	2333^{g}	41110^{cd}	29.20^{b}	66.70^{bcd}
	Equip herbicide	4400^{ef}	53890^{abc}	34.63^{ab}	71.77^{ab}
	Once time weeding	2433^{g}	45330^{abcd}	37.80^{a}	63.07^{cd}
	Equip+once time weeding	6711^{bc}	48890^{abcd}	34.10^{ab}	72.27^{ab}
Banding nitrogen	Non-control	4733^{e}	43060^{bcd}	31.73^{ab}	70.27^{abc}
	Equip herbicide	8133^{ab}	58330^{a}	32.97^{ab}	73.40^{ab}
	Once time weeding	7867^{abc}	56940^{ab}	34.60^{ab}	72.23^{ab}
	Equip+once time weeding	9022^{a}	52780^{abcd}	33.70^{ab}	75.80^{a}
Sprayed nitrogen	Non-control	2867^{fg}	41110^{cd}	28.13^{b}	60.0d
	Equip herbicide	6578^{bc}	41110^{cd}	32.13^{ab}	68.43^{abc}
	Once time weeding	3967^{ef}	48890^{abcd}	31.00^{ab}	72.07^{ab}
	Equip+once time weeding	6367^{cd}	54440^{abc}	29.37^{b}	72.43^{ab}

In column, means with the same letter are not significantly different at 5% level using Duncan's test

with non-controlling weed (Table 2). The interactive influence of nitrogen fertilizer and weed management was perceived that the most foliage yield achieved in the linear application in condition of herbicide utilizing. Generally the apply treatments of weed management in conditions that nitrogen would be presented that linearly has maximum foliage yield in comparison with non-application of nitrogen under condition of weed interference. In regard to weed control treatments to the gained results by IWM (herbicide+weeding) had the best yield in all applied treatments in comparison with other treatments (with the exception of the application of equip in condition of applying nitrogen linearly) (Table 3). Ghezeli and Meybodi (2010) observed that increasing herbicide is increase yield, because weed be controlled and then reduced the competitive power of weeds.

Hundred grains weight: According to the results of analysis of data variance, the effect of applying nitrogen on hundred grains weight was significant in 5% (Table 1). Maximum average of hundred grain weight belonged to linear application (33.93 g) and the least amount for it belonged to non-applying nitrogen (29.51 g) and in sprinkling was 30.16 g (Table 2). One hundred grain yield was not influenced by weed management (Table 1), by comparison of means, it was perceived the significant difference between the treatment of one stage weeding (33.28 g) and non-control of weeds was 29.56 g. Interaction effect of applying nitrogen and weed management was not significant on hundred grain weight. The effect of superficial distribution on nitrogen induced the increase 34.4% of it with weeding to sprinkling with non-controlling weeds (Table 3). Generally the hundred grain weight is an character which more dependent on the genetic traits of cultivars and less influenced by the environmental factors (Sadeghi and Bohrani, 2001). It seems the hundred grain weight is stable component of yield. Poneleit *et al.* (1980) showed that is effective component in setting the yield but has the less sensibility to another component yield.

Grain/cob Ratio: The result gained by analysis of data variance shown that the effect of applying nitrogen on the harvest index of corn was significant at 5% (Table 1). The linear application increased harvest index to 35.2% in comparison with non-application of nitrogen and had 27.5% increasing to superficial distribution (Table 2). Harvest index was significant influenced by weed management at 1% (Table 1). The maximum harvest index related to treatment of applying herbicide with one stage weeding (41.73%) (Table 2). The linear application of nitrogen (37.03) and superficial distribution had 36.63%, whilst the least amount of harvest index related to treatment of non-controlling of weeds with non-application of nitrogen (16.73%) and superficial distribution had 16.97% (Table 3). This matter expresses the intensive competition of weeds to absorb nitrogen in the surface of soil in comparison with crops. A more competition has been done by weeds to crops for absorb nitrogen, so that it has reduce the grain yield and harvest index in treatment of superficial distribution whilst it uniformity with non-application of nitrogen in presence of weeds. It results from above in view of the fact that nitrogen is one of the necessary requirement for corn and method of applying it had been important to better use for crop in the presence of weeds. And it can have the just impression on the increase of yield.

Cobs per plant: The effect of applying nitrogen on the number of corn ear was not significant (Table 4). So that with investigation of comparison of means, all level of applying nitrogen were put in one statically group and one rank. In despite treatments of nitrogen application affected on corn uniformity, so that they caused to increase the number of corn ear to 2.1% in comparison with non-applying nitrogen (Table 5). Results shown that the effect of weed management on the number of corn ear was not significant (Table 4). The least number of corn plant related to weed interference and the treatments of weed management had been most number of corn ear. Investigating of results gained expresses that all treatments of weed management affected on the number of corn ear as equality, so that they increase 2.1% of corn ear in comparison with control treatment (interference of weeds) (Table 5).

Table 4: Analysis of variance of cobs per plant, grain rows per cob, grain per row and cob weight per plant

		Mean square			
Source	df	Cobs per plant	Grain rows per cob	Grain per rows	Cob weight per plant
Replication	2	0.006	0.422	1.438	365.766
application method	3	0.001$^{n.s}$	0.458$^{n.s}$	171.339**	20122.839**
Error	6	0.003	0.443	14.499	651.849
Weed control	3	0.001$^{n.s}$	3.583**	71.879**	10666.561**
Application× Weed control	9	0.004$^{n.s}$	0.551$^{n.s}$	226.639**	8031.014**
Error	24	0.002	0.590	6.327	378.995
Coefficient of variation (%)		4.730	5.250	13.68	12.17

ns, ***Non-significant, significant difference at 5 and 1% level of probability

The effect of the interaction between nitrogen application and weed management was not significant on the number of corn ear (Table 4). The maximum number of corn ear in plant was observed in linear application of nitrogen in condition of controlling weeds by weeding, so that it caused increasing corn ear to 14.4% in comparison with non-control of weed with non-application of nitrogen and superficial spreading of nitrogen (Table 6).

Grain rows per cob: The results shown that the effect of applying nitrogen on the number of row in corn ear was not significant (Table 4). The most number of row related to treatment of the linear application that in comparison with control treatment was indicated the increasing the number of row to 3.1%. The comparison of means shown that sprinkling and superficial spreading caused the increasing the number of ro to 2.3 and 1.1% in comparison with non-applying the nitrogen (Table 5). Effect of weed management on the number of row was not significant at 1% (Table 4). The results shown that number of row was increased to 8.9% in herbicide application in comparison with weed interference. Whilst the treatment of one stage weeding and IWM (herbicide+weeding) caused to increase the number of row to 4.8 and 1.8% in comparison with non-controlling of weeds (Table 5).

The number of row influenced by interaction between method of applying nitrogen and weed management was not significant (Table 4). The most amount of increasing the number row was obtained in interaction of applying herbicide with superficial spreading of nitrogen, sprinkling and non-application of nitrogen. Non-controlling of weeds in different treatment of applying nitrogen had the least number of row, so that the superficial spreading with applying herbicide increased with treatment of non-applying nitrogen in the condition of non-control of weeds (Table 6). Most researchers believe that number of row in corn ear is a genetic characteristic and influenced less than by another environmental factors (Tetio-Kagho and Gardner, 1988).

Grain per row: The results shown that grain number in corn ear row was being influenced and was significant at 1% (Table 4). The linear application had been most number of grain in the row and caused to increase grain number in the row to 61.3% in comparison with non-application of nitrogen, whilst the linear application in comparison with superficial spreading and sprinkling was increased the grain number in the row to 91 and 38.1%, respectively in comparison with non-application of nitrogen. Non application of nitrogen caused the

Table 5: Effects of nitrogen application method and weed control on cobs per plant, grain rows per cob, grain per row and cob weight per plant

Factor	Levels	Cobs per plant	Grain rows per cob	Grain per row	Cob weight (g/plant)
Nitrogen application	No nitrogen	0.98^{a}	14.38^{a}	13.86^{c}	114.3^{c}
	Broadcasting nitrogen	1.00^{a}	14.53^{a}	20.48^{ab}	166.7^{b}
	Banding nitrogen	1.00^{a}	14.83^{a}	22.35^{a}	212.1^{a}
	Sprayed nitrogen	1.00^{a}	14.71^{a}	16.88^{bc}	146.6^{b}
Weed control	Non-control	0.98^{a}	14.08^{c}	16.13^{b}	128.5^{c}
	Equip herbicide	1.00^{a}	15.33^{a}	21.33^{a}	199.4^{a}
	Once time weeding	1.00^{a}	14.75^{ab}	16.63^{b}	162.6^{b}
	Equip+once time weeding	1.00^{a}	14.33^{bc}	19.48^{a}	149.2^{b}

In column, means with the same letter are not significantly different at 5% level using Duncan's test

Table 6: Interaction effects of nitrogen application method and weed control on cobs per plant, grain rows per cob, grain per row and cob weight per plant

Factor	Levels	Cobs per plans	Grain rows per cob	Grain per row	Cob weight (g/plant)
No nitrogen	Non-control	0.933^{b}	13.67^{c}	12.50^{e}	78.0^{e}
	Equip herbicide	1.00^{ab}	15.50^{ab}	16.47^{de}	181.5^{b}
	Once time weeding	1.00^{ab}	14.00^{bc}	15.10^{de}	157.3^{bc}
	Equip+once time weeding	1.00^{ab}	14.33^{abc}	17.83^{cd}	132.0^{cd}
Broadcasting nitrogen	Non-control	0.933^{b}	14.33^{abc}	17.90^{cd}	96.0^{de}
	Equip herbicide	1.00^{ab}	15.67^{a}	18.93^{bcd}	179.0^{b}
	Once time weeding	1.00^{ab}	14.33^{abc}	19.30^{bcd}	102.0^{de}
	Equip+once time weeding	1.00^{ab}	15.00^{abc}	19.30^{bcd}	97.7^{de}
Banding nitrogen	Non-control	1.00^{ab}	14.33^{abc}	16.20^{de}	142.7^{bc}
	Equip herbicide	1.00^{ab}	14.67^{abc}	25.30^{a}	230.0^{a}
	Once time weeding	1.067^{a}	14.67^{abc}	23.40^{ab}	247.0^{a}
	Equip+once time weeding	1.00^{ab}	14.67^{abc}	24.50^{a}	228.0^{a}
Sprayed nitrogen	Non-control	1.00^{ab}	14.00^{bc}	14.60^{de}	106.0^{de}
	Equip herbicide	1.00^{ab}	15.50^{ab}	24.60^{a}	161.0^{bc}
	once time weeding	1.00^{ab}	14.00^{bc}	16.73^{de}	144.0^{bc}
	Equip+once time weeding	1.00^{ab}	15.33^{ab}	21.60^{abc}	175.0^{b}

In column, means with the same letter are not significantly different 5% level using Duncan's test

reduction of grain number in the row to 47.8 and 16.7% in comparison with superficial spreading and sprinkling (Table 5). The effect of weed management on grain number in the row was significant at 1% (Table 4). The application of herbicide and IWM (herbicide+weeding) had most grain number in row, so that they were being settled in a statically group and was in the one level. Treatment of one stage weeding and non-controlling weeds had the least amount of grain in row and they were being settled in one statically group but the treatment of non-controlling of weeds had the least amount of grain in row, so that the application of herbicide caused the increasing of grain number in the row to 32.2% in comparison with weed interference (Table 5).Interaction between applying nitrogen and weed management was significant at 1% (Table 4). So that the application of herbicide with linear and sprinkling and also IWM had the most rate of grain in the row and statically they were being settled in one group and high level, so that the linear application with herbicide caused increasing of grain number in the row to 102.41% in comparison with non-application of nitrogen with weed interference (Table 6). Kamprath *et al.* (1982) were observed in some hybrids of corn, the response of grain yield to the rate of nitrogen existence in soli, is in the form of increasing the number of corn ear, length of corn ear and grain number in the ear.

Cob weight per plant: Weight of corn ear affected by applying nitrogen, was significant at 1% (Table 4). The results shown that the most weight of corn ear belonged to linear application, which caused the increasing of weight of corn ear to 85.6% in comparison with non-application of nitrogen. The superficial spreading was increased the weight of corn ear to 45.8% in comparison with non-application of nitrogen, whilst the linear application caused 27.2 increasing (Table 5). The effect of weed management was significant at 1% on weight of corn ear (Table 4). The application of herbicide caused the most rate of weight of corn ear to 55.2% in comparison with weed existence (control treatment). One stage of weeding and IWM were being settled in a statically group, were settled in next level. After the application of herbicide the caused increasing of weight of ear to 26.5 and 16.1%, respectively in comparison with non-controlling of weeds (Table 5). The effect of interaction between applying nitrogen and weed management was significant at 1% (Table 4).The results shown that non application of nitrogen with weed interference caused reducing of weight of corn ear to 68.4% in comparison with treatment of linear application with weeding. This reduction as compared with linear application with IWM was 66.08 and 65.8%, respectively.

CONCLUSION

The results of this study indicated that appropriate of macro nutrients (such as nitrogen) via best method fertilizer application (band nitrogen) increased the corn use of nitrogen. Furthermore band application of nitrogen reduced the availability of this nutrient for weed.

REFERENCES

Anderson R.L., D.L. Tanaka, A.L. Black and E.E. Schweizer, 1998. Weed community and species response to crop rotation, tillage and nitrogen fertility. Weed Technol., 12: 531-536.

Blackshaw, R.E. and R.N. Brandt, 2008. Nitrogen fertilizer rate effects on weed competitiveness is species dependent. Weed Sci., 56: 743-747.

Blackshaw, R.E., R.N. Brandt, H.H. Janzen and T. Entz, 2004. Weed species response to phosphorus fertilization. J. Weed Sci., 52: 406-412.

Cathcart, R.J., K. Chandler and C.J. Swanton, 2004. Fertilizer nitrogen rate and the response of weeds to herbicides. Weed Sci., 52: 291-296.

Chaab, A.N., G.A. Fathi, S.A. Siadat, E. Zand and Z. Anafjeh, 2009. The interference effects of natural weed population on growth indices of corn (*Zea mays* L.) at different plant densities. Iran. J. Field Crops Res., 7: 391-400.

Ciuberkis, S., S. Bernotas, S. Raudonius and J. Felix, 2007. Effect of weed emergence time and intervals of weed and crop competition on potato yield. J. Weed Technol., 21: 213-218.

Dunan, C.M., P. Westra and F.D. Moor III, 1999. A plant process economic model for weed management decisions in irrigated onion. J. Am. Soc. Hortic. Sci., 124: 99-105.

Ellis, J.M., J.L. Griffin, S.D. Linscombe and E.P. Webster, 2003. Rice (*Oryza sativa*) and corn (*Zea mays*) response to simulated drift of glyphosate and glufosinate. Weed Technol., 17: 452-460.

Ferrell, J.A., B.A. Sellers, G.E. Mac Donald and W.N. Kline, 2009. Influence of herbicide and application timing on blackberry control. Weed Technol., 23: 531-534.

Ghezeli, F.A.D. and M.A.B. Meybodi, 2010. Study on the possibility of reducing of dose of nicosulfuron in corn fields using nitrogen fertilizer management. Proceedings of the 3rd Iranian Weed Science Congress, February 17-18, 2010, Babolsar, Iran, pp: 205-208.

Harbur, M.M. and M.D.K. Owen, 2004. Response of three annual weeds to corn population density and nitrogen fertilization timing. J. Weed Sci., 52: 845-853.

Harzler, R.G., B.A. Battles and D. Nordby, 2004. Effect of common waterhemp (*Amaranthus rudis*) emergence date on growth and fecundity in soybean. J. Weed Sci., 52: 242-245.

Kamprath, E.J., R.H. Moll and M. Rodrigues, 1982. Effects of nitrogen fertilization and recurrent selection on the performance of hybrid populations of corn. Agron. J., 74: 955-958.

Lemieux, C., L. Vallee and A. Vanasse, 2003. Predicting yield loss in maize fields and developing decision support for post-emergence herbicide applications. Weed Res., 43: 323-332.

Lorzadeh, S., M.R. Enayat Gholizadeh and A. Chaab, 2010. Evaluation of integrated weed management efficiency (chemical+mechanical) in corn (*Zea mays* Cv.S.C 704). Crop Physiol., 2: 3-18.

Mennan, H., M. Ngouajio, D. Isik and E. Kaya, 2006. Effects of alternative management systems on weed populations in hazelnut (*Corylus avellana* L.). Crop Prot., 56: 335-341.

Poneleit, C.G., D.B. Egli, P.L. Cornelius and D.A. Reicosky, 1980. Variation and associations of kernel growth characteristics in maize populations. Crop Sci., 20: 766-770.

Radosevich, S., J. Holt and C. Ghersa, 1997. Association of Weeds and Crops. In: Weed Ecology: Implications for Vegetation Management, John Wiley and Sons, New York, USA., pp: 163-216.

Rajcan, I. and C.J. Swanton, 2001. Understanding maize-weed competition: Resource competition, light quality and the whole plant. Field Crops Res., 71: 139-150.

Sadeghi, H. and J. Bohrani, 2001. Effect of plant density and amount of nitrogen fertilizer on yield and yield components of maize. J. Iran. Agric. Sci., 3: 1-11.

Schuster, C.L., D.E. Shoup and K. Al-Khatib, 2007. Response of common lambsquarters (*Chenopodium album*) to glyphosate as affected by growth stage. J. Weed Sci., 55: 147-151.

Tamado, T. and P. Milberg, 2000. Weed flora in arable fields of eastern ethiopia with emphasis on the occurrence of *Parthenium hysterophorus* L. Weed Res., 40: 507-521.

Tetio-Kagho, F. and F.P. Gardner, 1988. Response of maize to plant population density. II. Reproductive development, yield and yield adjustments. Agron. J., 80: 935-940.

Zimdahl, R.L., 1988. The Concept and Application of the Critical Weed-Free Period. CRC Press Inc., Florida, USA., ISBN: 08-493-68162, pp: 145-155.