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The study of the effect of nitrogen rate and duration weed interference periods on grain yield and distribution of dry matter of corn (*Zea mays* L.)

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Abstract

Performance elements, an experience is implemented in summer 2010, at the station of Ahvaz agricultures research center as broken plot in a design framework of accidental blocks with 3 repetition. The main factor of different amount of nitrogen include 3 level N60, N120, N180 kg/lit pure nitrogen of urea resource & secondary factor of weeds intervention include 3 levels (i) continuous weed until the end of corn growth period (w1), (ii) one time weed in 6 leave level (w2), (iii) complete intervention of weed with corn until the end of corn growth period. The acquired results indicated that weed intervention on yield & yield component has a meaningful effect & by increasing the period of weed intervention, the grain yield is reduced. Increasing weed competition make a meaningful effect on grain weight, performance, biological performance & harvesting index. But increasing amount of nitrogen from N120 kg/lit to N180 kg/lit had not a meaningful effect on grain performance & in some cases due to high pressure, the competition from weed make reduction of grain performance, (once weed treatment & all season intervention). In low & high level of nitrogen, biological performance & corn performance is respectively affected by weed. According to the results of this experience, it can be resulted that by reducing competition time of weed, increasing N can make grain performance enhancement. In contrast to weed competition time, increasing nutritive ingredient is an affected weed growth more than agriculture plant &makes weed competition power enhancement.

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Introduction

Agriculture always struggle with weeds & reach to a significant progress. Human struggle with weeds by had & using animals & now it is continued through chemical & mechanical method (Rahimian *et al*, 2003). Weeds not only reduce the agriculture plants production &increasing agriculture costs, but also make some problem for public in different ways. Some of the weeds problems are as follow : (i) low performance of agriculture plant & animal & reduction of land consumption efficiency, increasing the costs of insect & herbal sickness control, reduction of product quality, increasing the problem of water management (Rhimian *et al*, 2003). Corn is a 4 carbon plant which according to its high potential of grain & forage production is developed for animal & birds feed in Iran & its cultivation is often prospered in the most provinces. The studies indicate that about 25 to 30 problematic weed are growing in corn fields which are consist of one year & several year types (vafabakhsh, 1995) which the weed damage in corn will be variable which it depends on density, type mixture, relative time of greening, climatic conditions, agriculture plant number (Williams *et al,* 2008) and other factors. If corn is not a weak competition relation to other plants, but however, need to control the weeds. Result of plant & weed intervention depend on some factors related to place particularly essential nutritive ingredients (Abouziena *et al,* 2008; Marin *et al*, 2007; talker *et al,* 1991; Tollenaar *et al,* 1994). Reduction of force power efficiency (Hence, nutritive ingredients are known as a probable solution for weed management (walker and Buchanan, 1982).

Also the most weeds use nutritive ingredients more than its need and so lux consumers may use fertilizer rather than agriculture plant. Instead nutritive ingredients make plants growth improvement, many studies indicate that adding more fertilizer has some benefit for weeds (Thomas *et al,* 2002). It is clear that plant and weed have different respond to nutritive ingredients. In all type of nutritive ingredients, N is an element make anxiety concerning weed competition. Many researches are done about weeds, Carlson and Hill (1986). Reported that increasing N fertilizer to infectious wheat to wild oats makes increasing weed density and reduction of plant performance. Acafer and Di date (1976) perceived that increasing N in rice is useful for cyperusrotundus & make reduction of light absorption, reduction of leaf surface index & reduction of rice grain performance.

Haas and streibig reported that album chenopodiu & polygonum convolvulus show a better reaction to high levels of N. Iqbal and wright (1997) perceived that Album chenopodiu biomass & brassica caber is significantly increased by increasing soil N from 20 mg/kg soil to 120 mg/kg which both respond to increasing N more than wheat.

N is often used in Iran corn fields, but many researches are done about N effect & weed intervention on corn performance. Many studies indicated that we absorb high amount of mineral rather than plants & make reduction of soil fertility & ultimately reduction of plant performance.

Abouziena *et al* (2008): Increasing amount of N can cause the enhancement of plant performance, but weed may have a negative effect on performance. Different result is reported about N effects on competition of corn with weeds. In a greenhouse experiment, Teyker *et al* (1991). Observed that by increasing amount of N its absorption in amarauthus retroflexus is more than corn & in higher level of N, the intervention of tum bleweedis feasible in corn. Other researchers reported that when the soil fertility is increased through adding N, weeds competition capability is might increase due to higher absorption efficiency (DiTomaso, 1995; sibuga and Baandee, 1980). Toller *et al.* (1994) reported that biomass reduces harvesting index & final corn performance is low N condition in contrast to high N and this is a short time after greening weed & its intervention with corn. According to previous statement & significant of N effect on corn performance & also intervention

effect of weed under effect of different amount of N, An experiment was done about these conditions. This study is an attempt to achieve optimum Nitrogen rate for corn production and yield components are determined. Effect of weed interference on yield and yield components critical to understanding the interaction of weeds. Interactive effects of nitrogen and weed interference on yield susceptibilities to these two factors.

Materials and methods

This experiment is implemented in Ahvaz agriculture researches center in 2009. Preparing land is included plough, two perpendicular drives and leveling the field. After choosing the design implementation place & before preparing operations, 16 plants of field is accidentally selected for sampling in order to soil analysis (In order to determination of N fertilizer). After distribution triple super phosphate fertilizer with amount of 200 kg, the field hitting disk. Then, some rows with distance of 75 cm are separated by groove maker. The type of used corn was single cross 704. Seeds were disinfected by gas poisoning boxing tyram & are cultivated at 27, May 2009.

The seeds cultivation is executed by hand & heap like (3-4 seeds in every in depth of 4 cm) in 75 cm rows (6 rows in every plot in length of 6 m) with the distance of 20 cm on rows (with density of 400 seeds in every square meter) & then the corns are thinning in 3 leave stage. According to high solubility for preventing N penetration of one plot to another one, a main stream is prepared for water accumulation & one stream for water exit. First irrigation was done one day after cultivation & next irrigation was done every 7 days until the end of growth the season. The method of irrigation was water leak during the experience no poison was used. The experiment was executed as broken plot in a design framework of accidental blocks with 3 repetitions. The main factor was N fertilizer level & secondary factor was weed intervention. The different amounts of N were N60, N120 and N180 kg/lit of pure N from urea source. Secondary factor (weed intervention) were w1 (weeding until the end of corn growth), w2 (complete intervention of weed with corn until the end of growth period.

To evaluate variables, first, every plot is divided into 2 halves. First half was for destruction sampling & second half for final performance. Two lateral rows of every plot & half meter of middle was eliminated as a border. In order to performance determination of a 3 square meter level is determined in sampling time & grain performance on the basis of 14% humidity. The elements of corn performance was included number of corn in bush, number of row in corn, number of grain in row & number of grain in corn & weight of 100 corns. From every 4 bush in every plot is measured one week before final harvesting.

In order to statistical evaluation & drawing graphs, it is used statistical software of SAS & EXCEL. To evaluate averages, it is used Duncan s multiple range test.

Results and discussion

Dry weight leaf and Stem

Analysis of variance showed a significant difference between the levels of nitrogen, there is a 5% probability level (Table 4-4). Means comparison showed an increase in nitrogen levels in leaf and stem dry nitrogen treatments 120N and 180N kg N ha were obtained (Table 4.4). Higher shoot dry weight and leaf dry weight at high levels of nitrogen can be the positive impact and development of leaf area and thus increase the rate of photosynthesis and dry matter accumulation in organs, among others. Aschnyr Moss (1995) and uhart and Andrade (1995) concluded that the impact of the reduced leaf area and leaf area duration, nitrogen deficiency in corn reduces the efficiency of radiant energy, and dry the amount of material brought. Stem and leaf dry weights were affected by weed interference levels at the one percent level, significant differences were observed between treatment interactions (Table 4-4). Maximum continuous dry stems and leaves of weeds and weeding treatments lowest leaf dry weight of infested all season. Leaf dry weight in the Weeding treatments first time all season weed interference And constant weeding weeds compared to 23 and 41%, respectively, decreased (Table 4-4).

The results showed that with increasing duration of complete interference, stem and leaf dry weight decreased between levels of weed infested weed first time all season was a significant difference corn weed was. The results of this study agree with the results Hagvd and colleagues (1981) reported that their interaction is planning a six-week crown canopy of black soybeans and black soybeans with high density planning a significant decrease in dry weight of stem and leaf. The interaction of different levels of nitrogen and weed interference on leaf dry weight did not show significant differences (Table 4-4).

Table 1. Analysis of variance yield components (Grain yield, Dry weight stem, Dry weight leaf, Biological yield) based on the mean square.

SOV	df	Grain yield	Dry weight stem	Dry weight leaf	Biological yield
R	2	4166	1617	30	6719
N	2	49295*	*11655**	1176*	67511*
Ea	4	4439	*1053*	327/7	8729
W	2	117300**	*41141***	251/5**	22661**
N*W	4	14680**	*3185*ns	129ns	28986**
Eb	12	1234	*2542*	173/1	4718
cv		5/1	*11/55*	7/77	4/35

**And* ns respectively significant at the one percent and five percent level, and no significant difference.

Grain yield

Effect of weed intervention on grain No. in corn was significant at the level of 1% (table 1). According to comparisons between N levels, the lowest amount was related to N60 kg/lit with the average of 607.51 g/m2 and the highest was related to N180 kg/lit with the average of 753.65 g/m2 (table 2).

Table 2. Comparison of yield components (Grain yield, Dry weight stem, Dry weight leaf, Biological yield).

Treatment	Biological yield (gr/m2)	Grain yield (gr/m2)	Dry weight leaf	Dry weight stem
nitrogen(kg ha)				
N60	1498.33 b	607.51b	398/208 b	158/8 b
N120	1594.62a	700.91 a	438/013 a	172/0 a
N180	1640.73a	753.65 a	470/039 a	176/4 a
Weed				
W1	1726/76 a	811.31a	450/478 a	171/2 a
W2	1596 b	664.23 b	430/982 b	168/2 b
W3	1410/92 c	586.53 c	424/799 c	167/9 b

Means with same.

Positive cohesion of amount of N has a meaningful effect on grain performance although between applications of N120, N180 is not a main difference (table 2). According to positive cohesion & grain performance, amount of N has an important effect on grain performance. These results indicated that N effect on grain performance enhancement was through grain No. in corn & grain weight (uhart and Andrade, 1995; Osborn, 2003).

Uhart and andrade (1995) and Tesa (1988) stated that N positive effect on light reception &increase photosynthesis on plant growth acceleration, leaf level index & its stability in corns make more

distribution & aggregation of dry material to grains. Sadeghi (2000) reported that grain number production potential in corn & weight enhancement had a cohesion with plant growth acceleration from silk week stage to the end which its result is grain performance increase. Strong cohesion between leaf level index & performance is reported by researches (kamperath Nunez, 1969; Dwyer, 1991). Daynard and tollennar (1982) declared that final corn performance depends on successes of flowers.

Growth, its complete fertilizing, fetus development, starch aggregation & protein in grain & each one needs a continuous cultured material supplying.

Table 3. Comparison of the effects of weeds and nitrogen on Grain yield, biological yield.

	Treatment weed* nitrogen	biological yield (gr/m2)	Grain yield(gr/m2)
nitrogen(Kg /ha)	weed		
N60		1615/8c	682/881 c
N120	Full weed*	1721/37 b	801/955 b
N180		1843/06 a	949/077 a
N60		1584/4cd	642/813 c
N120	1 time weeding*	1537/19d	704/143 c
N180		1666/3 bc	645/750 c
N60		1294/66 e	496/843 d
N120	Full interference*	1525/2 cd	596/615 c
N180		1412/81d	666/137 c

Means with same letter in each column are not significantly different at probability level of 5%.

The results of variance analysis for corn performance are exhibited in table 1. The results indicated that in weed intervention reduction in comparison, with weeding (w1), (w2) one time weeding & (w3) weed intervention were 664.23, 586.53% respectively (table 2). If, weed is not controlled, corn performance may be reduced from 15% to 100% which it depends on No. type of weed (ardekanian, 1996).

For example, Nezovic *et al* (1994). Mentioned performance reduction from 5% to 34%. In this experiment, intervention effect of 0.5 to 8 bushes of amaranthus in one meter of corn row was meaningful & by increasing time of weed intervention, the grain performance is reduced. Increasing N amount from N120 to N180 had no meaningful effect. In high density of weed, increasing nutritive ingredients is beneficial for weeds. By an integral management, it can be used fertilizing as a weed control tool.

Ramazani reported that (2000) increasing weed density for grain performance is more in high & mean level rather than low level.

Biological yield

Biological performance which indicates the aggregation of dry material in aerial parts in harvesting period was under effect of experimental treatments. Different amount of N on biological performance was meaningful. Positive cohesion between N amount & biological performance (table 4) indicated that biological performance by consumption of N120, N180 had a meaningful increase rather than N60. Highest biological performance from N180 is acquired with average of 1640.73 g/m2 (table 2). According to positive cohesion with leaf level index (table 4) it is appeared that N effect on performance is due toPositive effect of N on photosynthesis material in leaves & stem. These results are similar to majidian and ghadiri (2003), Sepehri (2002), Tohidinejad (1994), Roy and Tripathi (1987). Andrade and Uhart (1995) results that negative effect of N lack on leaf level reduction & its stability make reduction of efficiency of radiation,

cultured material amount & dry material aggregation. Variance analysis results indicated that weed intervention 1% probability level had a meaningful difference on biological performance. Negative cohesion between weed intervention & grain performance indicate that (table E1) biological performance is reduced by increasing weed intervention. Complete weeding in 1726.26 g/m2& weed intervention with biological performance in 1410.92 g/m2 were highest & lowest biological performance (table 2). According to positive biological performance with grain performance & leaf level index, these cases are reduced. Biomass enhancement of plant in good weeding condition make a sufficient strong physiological resource for using received light & dry material production more & more. These results are accordance with Lyle and Brodsky (1995) and Osborne *et al* (2002). By increasing weed intervention due to increasing competition (within form and out form) & being under condition of vegetative and natal growth, the performance is reduced. The most powerful cohesion is between grain performance & biological performance (table 4). Reduction of biological performance is due to weed density. Ramazani (2000) and Hoseininia (2000) reported that by increasing weed intervention, biological performance is reduced. Many researches indicates that adding N fertilizer to weeds in infected plot, make sever negative effect of weed on biological performance. (Ramazani *et al*, 2000; hoseininia *et al,* 2000). Different amount of N effect & weed intervention is meaningful for biological performance. Mohajeri and Ghadiri (2003) reported that weed intervention condition by increasing N to 100 kg/lit had a meaningful effect on wheat biological performance but not more than 100 kg/he.

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