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Effect of different water levels on the yield of Corn with trickle irrigation method(t-tape) in Moghan.

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Abstract— Water shortages have heightened the importance of water in agricultural production in the area and have triggered recent regulations affecting irrigation water use. Under these conditions, it is important to know how much yield can be expected from a given water allocation for each alternative crop, which is especially important for field corn (Zea mays L.), the most important irrigated crop in the region.The management of deficit irrigation is one of the savings strategies in water resources in agricultural sector. In the condition of deficit irrigation, the amount of product per unit area is less than the maximum production per unit of area, but the profit is increased. This research was conducted to study the effects of different levels of irrigation on grain and biological yield, yield components, and water use efficiency of grain corn (hybrid SC.704) in 2010 cropping season at Natural Resources and Agricultural Researches Center of moghan, north-west Iran.The study factorial split block experiment, Vertical strip irrigation factorial with three replications was conducted at Agricultural Research Center Moghan. Irrigation treatments included: full irrigation (I1), treatment is based on 50% water requirement (I2), treatment is based on 75% water requirement (I3), irrigation based on 120% water requirement (I4) (calculated for water based on Penman - mantis). The amount of water applied was determined by Class-A Pan evaporation every day. Required irrigation water was applied as 70 mm of evaporation of Class-A Pan. The total evaporation from Class-A Pan was measured with a manual limnimeter that has 0.1 mm accuracy. These measurements were checked with the readings from the water flow meters mounted in every plot. The results indicated that the effect of drought stress on grain and biological yields was significant at 1% probability level. The maximum grain yield of about 10.1 ton per hectare was obtained in 100% water requirement (I1). Step-wise regression analysis indicated that about 88% of grain yield variation was related to the grain number per ear. The investigation also indicated that because there is no significant difference in the grain yield between the water level of 100% and 120% water requirement, in conditions which we have to apply mild deficit irrigation, the irrigation treatment of 100% water requirement for corn is recommended..

Index Terms— Corn, Irrigation, Tape (T-tape), water use efficiency.

1 INTRODUCTION

The restriction of water resources and the improvement of modern agriculture have caused the progress in the value of production inputs and the researches position of optimizing consumption of water. To achieve the prospect of strategic method and sustainable use of water and soil resources, some indicators are effective, which the compilation and explanation of optimal model of water usage in agriculture is among the most important ones. Iran, with having different and proper climate is a potentially capable area for the crop production. The plain of moghan is also appropriate for growing crops especially grain corn because this area has flat and fertile lands with a lot of solar energy. Corn is highly adapted to such hot climates due to the fact that it is a C4 plant and has high potential for biomass production in this area [1]. Although, the cultivation of corn has developed after harvesting of wheat in recent years on the north west of Iran, but water deficiency especially in warm summer seasons has been the main factor to limit its cultivation. For semi arid area, the control of soil moisture profile is suggested as the appropriate method of irrigation management and it is estimated that the water requirement of maize in this region is 1.561 mm [2]. Optimization of water consumption means timely and enough irrigation, and is consistent with the principle of irrigation engineering [3]. There is a relatively linear relationship between the amount of irrigation water and the crop yield but if the amount of water is more than 50% of full irrigation, the relationship will be nonlinear [4]. Water availability is a prerequisite for the sustainable development of the Arid and semi-arid region, which is characterized by water scarcity and extreme events of droughts. Major current and future problems with fresh water resources in this region arise from the pressure to meet, agricultural, human and industrial needs of a fast-growing economy that generates growing imbalances between demand and supply of water [5], [6] reported that drought stress reduces the corn yield through the reduction of the leaves chlorophyll and negative impacts on silk production and pollination periods. [7] found that grain yield and water use efficiency responses to irrigation varied considerably with differences in soil–water contents and irrigation schedules. The efficient use of water by modern irrigation systems is becoming increasingly important in arid and semi-arid regions with limited water resources [8]. In the condition of deficit irrigation, the amount of produced yield per unit area becomes less than the maximum yield per unit area, but the profit will be increased. Several authors have shown that the water use efficiency (WUE) and yield of drip irrigated crops

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could be improved under limited water applications by decreasing the amount of water that leaches beneath the root zone [9],[10],[11]. Corn is a popular and nutritious snack food (boiled or charbroil) besides the grain and silage production in iran. However, it is possible to achieve optimum quality and quantity of crop production per unit area if a proper irrigation method is applied along with other agronomic interventions [12]. The relationships between crop water use (ET) and yield have been a major focus of agricultural research in arid and semi-arid regions [13] Corn has been reported in the literature to have high irrigation requirements. Corn dry matter and grain yield increased significantly by irrigation [14]. However, corn has been reported to be very sensitive to drought. Water stress can affect growth, development, and physiological processes of corn plants, which can reduce biomass and, ultimately, grain yield due to a reduction in the number of kernel per ear (cob) or the kernel weight [15]. The objectives of this study were to determine the effect of different levels of irrigation on grain and biological yields, yield components, water saving in irrigation and maximizing water use efficiency and the development and promotion of corn planting in the hot and Semi-arid climates of moghan.

2 2 MATERIALS AND METHODS

The influence of different levels of irrigation on grain and biological yields, yield components, and water use efficiency of grain corn (hybrid SC. 704) was assessed in 2010 cropping season in experimental field in Natural Resources and Agricultural Researches Center of moghan, north-West Iran (latitudes ranges of approximately 46°52'53″E - 48°21'30″ E and 39° 0' 0″N -39°36'20″N, respectively) with moderate winter and hot summer.

Fig. 1:Map of Moghan Plain, the study area in northern part of Ardebil Province comprisesthree counties; Pars Abad, Bileh Savar and Germi

The organic matter was less than 1% (0.93%), available phosphorous 16.2, potassium 317.9 (all values of nutrients in mg/kg of dry soil). The soil pH was 7.3 and soil electrical conductivity (Ece) 2.9 ds/m. The study factorial split block experiment, Vertical strip irrigation factorial with three replications was conducted at Agricultural Research Center Moghan. Irrigation treatments included: full irrigation (I1), treatment is based on 50% water requirement (I2), treatment is based on 75% water requirement (I3), irrigation based on 120% water requirement (I4) (calculated for water based on Penman - mantis). The amount of water applied was determined by Class-A Pan evaporation every day [16]. The amount of irrigation water was calculated using Equation 1 [13]:

$$I = AE_{pan}K_{cp} \qquad (1)$$

Where I is the amount of irrigation water (mm), A plot area (m2), Epan cumulative water depth from Class A Pan based on irrigation frequencies (mm), Kcp is crop pan coefficient. Base fertilizer-consisting of 180 kg N ha- 1 in the form of urea (N 46%), 100 kg P ha-1 in the form of super phosphate (P2O5 45%), and 50 kg K ha-1 in the form of potassium sulfate (K2O 45%).Half of the N and all of P and K were applied before sowing (incorporated by disk). The remaining N was applied as a top dressing one month after sowing.Total dry matter, relative grain yield, the harvest index (HI) and yield components were estimated after physiological maturity by harvesting interior rows (the outer rows excluding at least 0.5 m from either end of the rows).

$$HI(\%)=(\text{Grain yield}/\text{Biological yield})\times 100 \qquad (2)$$

Water use efficiency, defined as the ratio of grain yield per hectare to the amount of irrigation water, was calculated using the methodology provided by [17]. Statistical analysis was made using the mstat-c statistical program. Differences between traits means were assessed using Duncan test. 27 plots were established initially according to experimental design study. Thus each experimental plot area had a surface area of 24 m2 , with 4* 6 dimensions and total area equals to 800 m2 . Each plot was consisted of five plant lines and six meter length. In addition, the distance between main plots was estimated three meters, whereas the plant distance on each row was 20 cm and the rows were 75 cm far from each other. Plough, two vertical disks, leveling, furrow, mound were used regarding plot making. The soil texture was loamy silt clay. Frequent soil analysis was performed for determination of fertilizer content. The grains used in this study were Hybrid single cross 704. The seeds were sown at a 50-60 mm depth.The first irrigation was carried out in 27 June and thinning conducted in 4-5 leaf stages. The weeding was conducted in 2 stages of 20 and 40 days after planting, respectively. Moreover, nitrogen fertilizer applied in two stages of 4-6 leaf-age and flowering time. Soil samples were taken with an auger from the soil layers 0 to 30, 30 to 60 and 60 to 90 cm to determine selected physical and chemical properties of the experimental field at the beginning of the experiment (Table 1). Standard methods were used to determine other properties of soils in the experimental field. Available water holding capacity of the soil is 160 mm in the 0.90 m soil profile. Water table depth was well below 90 cm soil profile in the study area. Field capacity of the soil was 33.8% (dry basis), permanent wilting point was 22.6% and bulk density of the soil was 1.41 g/cm3. Hand harvesting was performed about 115 days after sowing. According to results of the analyses, the irrigation water salinity was 1.5 dS m-1 and has no serious harmful effect on plant growing. Ears from two rows in the centre of each plot (50 plants) were manually harvested. Plant height values were measured on randomly selected 20 plants in the centre of every plot before harvest. Randomly selected 20 ears without husk were used for determining of ear lengths, ear diameters, kernel numbers per ear and single fresh ear yield values,Thousand seed weight,Seed depth. First irrigation was applied to all treatments using a sprinkler irrigation system to bring the soil water content in 0-90 cm soil depth up to field capacity. Irrigation treatments were started using surface drip irrigation(t-tape) system when the water content of soil decreased to 50% of available soil water. The amount of irrigation water was calculated using the equation given below,

$$I = AEpan\ Kcp\ CAI \quad (3)$$

where, I is the amount of irrigation water (mm), A is plot area (m2), Epan is cumulative water depth in the Class A pan (mm), Kcp is the crop pan coefficient [determined as 100 , and CAI is the canopy area index, which was assumed to be 1. The data obtained from the experiments were analysed with ANOVA and LSD tests. Correlation between performances of water consumption was estimated by the Stewart model in which was used dimensionless parameters of the relative reduction in product and the relative water consumption.

$$1 - (Ya/Ym) = Ky * (1 - (ETa/ETm)) \quad (4)$$

Where Ya is actual yield (ton per hectare); Ym the maximum yield (ton per hectare); Ya/Ym relative yield; 1 - (Ya/Ym) decrease in relative yield; ETa actual water consumption (mm); ETm maximum water consumption (mm); ETa/ETm the relative water consumption; 1 - (ETa/Etm) the relative reduction in water consumption; Ky Yield response factor. Statistical calculations were performed using mstat-c. Excel software was used for charts adjustments as well. It should be pointed out for means comparison we applied DunCan's multiple range test at 0.05 probability levels when the F values were significant.

Table 1. Some chemical and physical properties of the experimental soil.

Soil depth (m)	Texture class	Field capacity (%)	Wilting point (%)	Bulk density (t m-3)	EC(dS m-1)	pH
0.0-0.30	c	42.2	21.8	1.41	0.27	8.1
0.30-0.60	cl	34.4	17.6	1.39	0.266	7.7
0.60-0.90	cl	38.7	22.7	1.45	0.275	8

EC – Electrical conductivity of soil in 1:2.5 soil: distilled water suspension.

3 3 RESULTS AND DISCUSSION

3.1 3.1 Statistical analysis

3.1.1 3.1.1 Yield components

All yield components except for Seed depth were responded to the changes in amount of water applied (Table 2). As amount of water applied increased, grain number per ear and 1000-grain weight increased whereas irrigation treatments had no significant effect on Seed depth. These results are comparable to those observed earlier by [1],[18],[19],[20].

3.1.2 3.1.2 Evaluation of seed yield

The results of analysis of variance showed that the effect of irrigation on grain yield was significant in 1% probability level (Table 2). The highest grain yield about 10.1 ton per hectare was obtained in 100% water requirement (I1). in the Drought severe stress reduced grain yield by compared to the optimum irrigation condition, this reduction was mainly due to reduction in grain number per ear and average grain weight (Table 5). Step-wise regression analysis indicated that about 88% of grain yield variation was related to the grain number per ear (unpublished data). Since drought stress causes a decrease in leaf area index [21],[22] a reduction in yield is observed because of low photosynthesis. Two reasons were considered for yield reduction at deficit irrigation: high water holding capacity of soil and existence of drought stress throughout the growing season were cited [23]. A linear relationship has been reported between crop yield and seasonal water consumption [24],[25],[26]. Scientists believe that ideal irrigation should occur when there is 50% water discharge from plant roots [27]. For instance, [28] reported that average corn grain yields were 1.05 t ha-1 for nonirrigated treatment and 10.02 t ha-1 for full irrigated treatment.

3.1.3 3.1.3 Biological yield

In present study variance analysis demonstrates that irrigation levels have significant impact on dry matter content (Tab 5). The results indicated that the effect of irrigation levels on biological yield was significant. The highest rate of biological yield (21.74 tons per hectare) was obtained from 120% water requirement (I4) (Tables 5). Increasing amount of water applied improved the weight of stem and leaf mainly due to increased leaf area index and leaf area duration. The dry matter production of non-stressed plants is usually higher compared to stress plants since drought-stressed plants cannot utilize solar radiation effectively. During drought stress the influx of CO_2 through stomata follows a decreasing trend resulting in leaves aging development and finally leads to an elevation of carbohydrate supplement for plant survival, in other words, since root absorbs more nutrients in contrast to shoot in drought stress, plants are not capable to produce carbohydrate for growth continuance. This procedure leads to a reduction of dry matter content in aerial shoot [29]. It should be pointed that water deficiency in seed filling stage results in dry matter accumulation decrease and simultaneously shorten seed improvement period [30].

3.1.4 3.1.4 Harvest index

Harvesting index is an efficacy expression of photosynthetic products in plants in contrast to seeds. In addition, harvesting index illustrates the transmission of photosynthetic products from vegetative organs into seeds. The way in which dry matter distributes in different plant organs is a presentation of economic efficiency.Analysis of variance showed that harvest index was affected by irrigation regimes was significant. The highest and lowest harvest index of irrigation I3 and I2 respectively 63.50 and 30.42 respectively. Since the intensity of the total dry weight yield stress decreased, the decreased harvest index. In addition to reducing stress and impaired production of dry matter partitioning of carbohydrates to seed and harvest index were reduced. [31] Severe drought stress on yield losses greater than the total dry weight of vegetative growth and reproductive growth more sensitive to drought stress decreased the main cause of harvest index knew.

3.1.5 Economical and biological water use efficiency

economical and biological water use efficiencies mainly due to increased grain and biological yields. The highest rate of economical and biological water use efficiency (1.85 and 2.85 kg. m-3) was obtained from 120% water requirement (I4) (Tables 7). The findings obtained in this study were in good agreement to those values previously reported in the literature for corn crop [32],[33],[34].

3.1.6 Seed depth

Seed depth was not affected by irrigation regimes And not statistically significant.

3.1.7 Water use efficiency

Water use efficiency were affected by different irrigation regimes and was significant. Highest and lowest water use efficiency of irrigation treatments I2 and I4 respectively 1.32 and 0.81 respectively. Since corn is a four carbon photosynthetic pathway, thus water use efficiency is relatively high. Cause yield reductions in water use efficiency is that For this reason the lack of water in the plant is capable of stomata some more packs hold. Mansourifar et al (20) concluded in their research that the highest water use efficiency under water deficit in maize is achieved. Significant linear relationships were obtained between grain yield and WUE from the regression analysis. The IWUE values increased with the decreasing seasonal irrigation amounts or seasonal water use (Table 7).

3.1.8 Germinate

Results of data analysis show that different levels of irrigation had no significant effect on Germinate.

3.1.9 Pollination

Analysis of variance showed that different irrigation levels had significant effect on pollination. So that I2 irrigation with 67.62 days of the earliest and I4 irrigation with 33.76 days had The most late pollen.

3.1.10 Physiological maturity

Analysis of variance showed that different irrigation levels had significant effect on Physiological maturity. So that I2 irrigation with 3.111 days of the earliest and I4 irrigation with 3.127 days had The most late.

3.1.11 Chlorophyll content

Chlorophyll content was significantly affected by irrigation regimes. The results show that the highest chlorophyll content related to 50% irrigation treatments equals 80.45 and the lowest chlorophyll levels equals 37.34 is related to 120% irrigation. Mansourifar et al (20) stated that the lack of water will result in reduced amounts of chlorophyll.

3.1.12 Number ears per plant

Results of data analysis showed that the number ears per plant was not affected by irrigation regimes.

3.1.13 Number of kernels per ear

Number of kernels per ear decreased with increasing deficiency in irrigation water (Table 5). Similar findings were reported by [35],[36],[37],[31].Comparison between grain number per ear in irrigation regimes showed the highest number of grains per ear related to I1 and I4, respectively, 7.755 and 7.753, and the lowest number of grains per ear, with 3.677 is related to I2 irrigation. Number of kernels is closely associated with yield of maize and the number of kernels per ear is a yield component that varies markedly with stress [39],[40] mentioned that water stress caused failure of kernel development, its number, size and weight. [31] stated that kernels per ear were reduced from 20% to nearly 50% due to water stress. There is a general agreement that final kernel number is established about two to three weeks after pollination [41]. Any stress imposed during this period greatly affects kernel set.

3.1.14 Thousand seed weight

Three main steps in plant growth in drought stress are considered as flowering, pollination and seed filling. In addition, among the yield components, traits like kernel number and ear width have the close correlation to yield [42]. The impact of irrigation levels also was evaluated on thousand-kernel weight simultaneously. The latter trait reacts with water treatments significantly (Tab 5). Comparison between irrigation regimes on Thousand seed weight showed the highest Thousand seed weight related to I1 and I4 with 300 g and 271 g, and lowest Thousand seed weight is related to I2 irrigation. Many researchers have stated that the most important factor is the reduction in seed weight under severe water stress, Shorten the seed filling duration. [43] demonstrated that a limited partitioning of dry matter to reproductive tissues during the critical period (bracketing silking) results in low numbers of kernel set. Furthermore, ovules remain undeveloped resulting in many kernels being small and light in weight.

3.1.15 The number of seed rows per ear

Comparison of the number of kernel rows between irrigation regimes showed the highest number rows related to I1 and I4, respectively, 5.15 and 6.15 row, and the minimum number of seed rows per ear with 2.14 is related to I2 irrigation. I3 irrigation regime with 6/14 row,located in the middle group. Reducing water use in corn, can reduce the number of kernel rows.

3.1.16 Number of kernels per row

Comparison of the Number of kernels per row between ir-

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rigation regimes showed the highest Number of kernels per row related to I4 and I1, respectively, 40.6 and 40.8, and the minimum Number of kernels per row with 37.7 is related to I2 irrigation. Reduced performance in irrigation I2 is due to reduced the number of seeds per row. One of the most important components of corn yield,is number of seeds per row. This attribute may be due to Delay in the emerged of forelock or abortion due to the lack of carbohydrates,reduction. [44] stated that water stress during of flowering and early filling seed reduced the number of kernel per row. Scientists believe that kernel number decrease is due to tassel expression postponement [31]. In a study decreasing trend of kernel numbers were determined [45]. It should be pointed that drought stress occurrence during pollination procedure has a great impact on seeding by leaves photosynthesis retardation simultaneously, which leads to decrease of kernel numbers [18].

3.1.17 Influence of irrigation levels on corn plant height

Comparison of the corn plant height between irrigation regimes showed the highest corn plant height related to I4 and the minimum corn plant height related to I2 irrigation, respectively, 279.5 and 248.2 cm. Among the many factors resulting in decrease of plant height we can mention declines in shoot internodes, decrease in water and nutrients absorption. Corn plant height significantly interacts with irrigation treatments (Tab 6).

3.1.18 Impact of irrigation levels on ear length

Ear length decreased with increasing water deficiency. Studies state that long interval irrigations and water deficiency significantly affect traits such as yield and kernel number in each row. In present study irrigation levels have no significant impact on ear length (Tab 6). Comparison of the ear length between irrigation regimes showed the highest ear length related to I4 and the minimum ear length related to I2 irrigation, respectively, 16.69 and 14.28 cm.

Table 2:analysis of variance Quantitative characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape.

Mean-square							Degrees of freedom	Sources of variation
Harvest index	Biological function	Seed per ear	Seed yield	Thousand kernel weight	Number of seeds per row	Number of rows per ear		
9.45^{ns}	1.90^{ns}	18.25^{ns}	0.17^{ns}	14.44^{ns}	0.11^{ns}	0.002^{ns}	2	Repeat
35.27^{**}	30.24^{**}	3998.44^{**}	8.19^{**}	754.15^{**}	22.34^{**}	1.95^{**}	3	Treatment
3.12	1.17	126.69	0.15	9.83	1.16	0.04	6	Error
3.78	5.89	1.55	4.62	1.09	2.78	1.30		Coefficient of Variation(%)

ns, * and **, respectively, non-significant and significant at the %5 and %1

Table 3: analysis of variance Quantitative characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape

Mean-square							Degrees of freedom	Sources of variation
Number of leaves	Flag leaf width	Flag leaf length	Ear diameter	Stem diameter	Ear height	Plant height		
0.30^{ns}	0.002^{ns}	0.11^{ns}	0.70^{ns}	3.56^{ns}	9.05^{ns}	0.34	2	Repeat
16.96^{**}	0.213	20.60^{*}	41.25^{**}	88.52^{**}	330.91^{**}	625.17	3	Treatment
0.88	0.004	2.35	4.90	2.00	4.70	6.93	6	Error
5.89	1.22	4.26	4.80	4.37	1.40	1		Coefficient of Variation(%)

ns, * and **, respectively, non-significant and significant at the %5 and %1

Table 4: analysis of variance Quantitative characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape

Mean-square					Degrees of freedom	Sources of variation
Water use efficiency	Chlorophyll content	Physiological maturity	Pollination	sprout		
0.002^{ns}	5.77^{ns}	8.08^{ns}	7.58^{ns}	0.043^{ns}	2	Repeat
0.132^{**}	70.06^{**}	129.41^{**}	103.22^{**}	0.003^{ns}	3	Treatment
0.002	4.62	10.75	5.80	0.386	6	Error
4.42	5.44	2.75	3.48	8.22		Coefficient of Variation(%)

ns, * and **, respectively, non-significant and significant at the %5 and %1

Table 5: Comparison of the mean characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape

Harvest (%)index	Biological ton)function (Per acre	Seed per ear	Seed ton)yield (Per acre	Thousand kernel (gr)weight	Number of seeds per row	Number of rows per ear	Irrigation
47.36ab	21.47a	755.66	10.17a	301.6a	41.4a	15.77a	I_1
42.30c	15.61b	677.33	6.6c	269.8c	35.5c	14.1c	I_2
50.63a	15.64b	725.33	7.9b	279.8b	37.7b	14.6b	I_3
46.90b	20.73a	753.66	9.71a	301.1a	40.67a	15.63a	I_4

Common letters in each column indicate significant non differences between treatments.

Table 6: Comparison of the mean characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape

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Number of leaves	Flag leaf (cm)width	Flag leaf)length (cm	Ear)diameter (mm	Stem diameter (mm)	Ear height(mm)	Plant)height (cm	Irrigation
17.70a	5.68a	37.46a	48.53a	36.16a	159.00b	271.50b	I_1
12.80c	5.13c	32.53b	40.96b	24.83c	142.80d	247.70d	I_2
15.40b	5.47b	35.56ab	46.06a	32.30b	150.10c	255.50c	I_3
17.86a	5.70a	38.50a	49.10a	36.53a	166.90a	279.30a	I_4

Common letters in each column indicate significant non differences between treatments.

Table 7: Comparison of the mean characteristics of corn(hybrid SC.704) under different irrigation regimes by t-tape

WUE (kg/m^3 water)	Chlorophyll content (spasd)	Physiological maturity (day)	Pollination (day)	Sprout (day)	Irrigation
1.01b	37.63bc	120.33b	71.00b	7.53a	I_1
1.32a	45.80a	111.33c	62.66c	7.53a	I_2
1.05b	40.23b	118.67b	66.66bc	7.6a	I_3
0.81c	34.36c	127.33a	76.33a	7.56a	I_4

Common letters in each column indicate significant non differences between treatments.

Table 8: Simple coefficient correlation between traits

	Grain yield	No. seed per row	1000-grain weight	No. grain per ear	Harvest index	Biological yield	wue
Grain yield	1						
No. seed per row	.954**	1					
1000-grain weight	.952**	.910**	1				
No. grain per ear	.927**	.942**	.913**	1			
Harvest index	0.381	0.414	0.352	.587*	1		
Biological yield	.929**	.865**	.884**	.769**	0.011	1	
wue	-.751**	-.750**	-.814**	-.841**	-0.447	-.637*	1

ns, * and **: Non significant, significant at the 0.05 and 0.01 probability level, respectively.

4 CONCLUSION

In recent study, the effects of irrigation regimens on corn plant (SC.704) were significant. Concurrently management of maize plant in moghan region with high potential of corn yield is inevitable. In this study, the highest grain yield was obtained from full irrigation (I1) treatment as about 10.1 ton per hectare while the lowest yield was found to betreatment is based on 50% water requirement (I2)as about 6.8ton per hectare.Grain yield was reduced as the amount of irrigation water decreased. optimal for corn grown in semi-arid regions similar to the area in north west of Iran where this study was conducted and can cause plant growth increase and high yield access.by means of an appropriate irrigation treatment, a combination of improved growth properties in canopy plant could be attained, as a result the optimum condition for yield development provided.The results of this corn research indicated that irrigation with 100% of Class A pan evaporation by t-tape irrigation system would be optimal under adequate water source conditions However, slightly deficient irrigation applications would be acceptable under scarce water conditions for corn grown in similar regions where this work was conducted.

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