EFFECT OF ALTERNATING IRRIGATION WITH DIFFERENT SALINITY WATER ON THE GROWTH AND YIELD OF SOME Corn GENOTYPES (*Zea mays L*)[+]

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Abstract

Filed experiments were carried out during 2000-2001 and 2001-2002 seasons, At the AL – wahda experimental station of state board of Agricultural research, in saline silty clay texture soil classified as Vertic Torrifluvent. A factorial experiment with a complete ravdomized block design with three replicates were used to evaluate the effect of Irrigation practices (continuos and alternating practice), A0 (continuos Irrigation with river water 1.2 ds.m^{-1}) , A1 (two irrigations with river water and one Irrigation with salinity water of level 3,6 and 9 ds.m^{-1} reperesent A13, A16 and A19 respectively) and A2 (two Irrigations with salinity water of level 3,6 and 9 ds.m^{-1} and one Irrigation with river water) reperesen (A23, A26 and A29 respectively) on salt accumulation in the soil and growth traits and yield of four genotypes of Corn, in cluding Behoth 106, Talar, AL–Ezz and hybrid 3001 reperesen V1,V2,V3 and V4 respectively, and also to know the proportion of fresh water which can be saved by applying the alternating practice.The results showed no significant effect between irrigation practices (A0 and all treatments of A1) on the salt accumulation in the soil in comparison with A2 which caused 55% increasing in salt accumulation in the soil as the average. The applied irrigation practices showed significant effect on the plant height, dry matter yield, ear weight, grain yield and protein percentage in the grain. However, no significant effects was detected as far as oil content in the grain was concerned. Results also showed the superiority of V1 and V2 genotypes compaired with the other genotypes in terms of grain yield which gave 3.81 Meg. ha^{-1} as average production . It was concluded that the alternating method (A1) save about 28.57% of fresh water.

المستخلص

نفذت هذه الدراسة في محطة تجارب الوحدة التابعة للهيأة العامة للبحوث الزراعية خلال الموسم الزراعي لعام2001و2002 في تربةملحية طينية غرينية مصنفة Vertic Torrifluvent أستخدمت التجارب العاملية حسب القطاعات العشوائية الكاملة وبثلاث مكررات لدراسة تأثير اسلوب الري بالمياه العذبة و المالحة (المستمر والمتناوب)، A0 (ري مستمر بمياه نهر ملوحته 1.2 ديسيسيمنز.م$^{-1}$) و A1 (ريتين بمياه النهر تليها رية واحدة بالمياه ذات المستويات(3،6، 9 ديسيسيمنز.م$^{-1}$) (A13، A16، A19) على التوالي و A2 (ريتين بالمياه الملحية بالمستويات 3، 6، 9 ديسيسيمنز.م$^{-1}$ تليها رية بمياه النهر) (A23، A26، A29) على التوالي، على تراكم الاملاح في التربة ونمو وانتاجية اربعة اصناف من الذرة الصفراء هي (بحوث 106 وتالارو العزوهايبرد ٣٠٠١) (V1، V2، V3، V4) على التوالي،كَذلك لتحديد كمية المياه العذبة الممكن توفيرها باستخدام اسلوب التناوب في الري.اظهرت النتائج ان استخدام اسلوب الري A1 لم يكن له تأثير معنوي على تراكم الاملاح مقارنة بالاسلوب A2

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الذي سبب زيادة في تراكم الاملاح. وان نسبة المياه الممكن توفيرها عند تطبيق اسلوب الري A1 هي 28.57%. اظهرت النتائج كذلك ان لاسلوب الري تأثير معنوي وايجابي في صفات النمو للاصناف المدروسة ارتفاع النبات و حاصل الوزن الجاف للنبات ووزن العرنوص و حاصل الحبوب، حاصل الكالح ونسبة البروتين في الحبوب . في حين لم يكن له تأثير معنوي على نسبة الزيت في البذور، واتضح هناك فروق معنوية بين الاصناف من حيث مؤشرات النمو والحاصل والنوعية حيث تفوق الصنفان V1 و V2 حيث اعطت حاصل حبوب بلغ 3.81 طن.هـ$^{-1}$ كمعدل مقارنة بالصنفان V3 وV4 اللتان اعطتا ادنى قيمة بلغت 3.28طن.هـ$^{-1}$ كمعدل .واستنتجت امكانية توفير ٢٨,٥٧% من المياه العذبة عند استخدام اسلوب الري المتناوب A1 .

Introduction

The enormous population increasing with geometrical sequence converse genealogy stability in fresh water sources, which needs optimum investment for water volume unit and searching for new water sources as an alternative for fresh water in the agricultural investment. [1] indicated that there was certain expectation in Arabian water deficit during the years 2000-2030, where the expected deficit in the year 2000 was about 28.23 billion cubic meter. But in Iraq there was a big change in volume of fresh water source and we expect that a certain deficit in water will occur in the coming future, the influence could be attributed to the Turkish dangerous projects that invests Tigris and Euphrates rivers water, these projects are expected to cause extreme negative effects on irrigation projects which reduce the cultivated area to about 75%, and this may load to a large disaster to happen if we don't find the suitable solutions. This needs an objective to reduce the volume of fresh water which is used in irrigation, through development of water transport devices or selection of the varieties resistance to salinity with high productivity or development of farm irrigation practices from which we can reduce the volume of fresh water or use the salinity water as an alternative. But the suitability of salinity water tobe used depends on the total soluble salt concentration in the water and concentration of some toxic ions which have damaging effects of the soil properties and plant growth [2].

The results of [3],[4]and [5] showed that the increasing in irrigation water salinity effected positively on the electrical conductivity values in the soil solution, Also the management of water methods, as alternation and used irrigation practices and leaching requirement have relationship with salt accumulation in the soil . [6] studies indicated that the use of one irrigation with fresh water followed by three irrigations with salinity water caused increasing in soil salinity to a depth of (90 cm) and reducing the yield of wheat which have grown in sandy loam soil in a percent of (6, 15 and 25%) for water salinity 6, 9 and 12 ds.m^{-1} respectively.

In addition to the above the suitability of salinity water for irrigation was related with crop type. Where [7] has indicated that corn and oats continued to grow despite the irrigation water salinity has reached to 11 ds.m^{-1}, but tomato crop was damaged at this salinity level.

There fore in this study chosing Maize crop which was important cereal crop with moderate resistance to salinity. [8] have indicated that the corn resists the salinity to a level of 8 ds.m^{-1}, but the growth decreases with increasing the salinity after this level.

The aims of this study is to evaluate the effect of irrigation practices (continuos and alternating practice) 1- on salt accumulation in the soil . 2- growth and yield of some Cron genotypes . 3- to know praportion of fresh water which we can save by applying the alternating practice.

Materials and methods

Two field experiments were carried out at the AL- wahda experimental research station of state board of agricultural research during autumn growing sea son of 2000/2001 and 2001/2002 in saline silty clay soil classified as Vertic Torrifluvent, Soil samples were collected from the plow layer (0-30 cm) before sowing.

Soil samples was air dried, ground and passed through a 2mm screen, it was then analyzed according to the methods described by [9] and [10], some physical and chemical characteristics of this soil are presented in Table (1).

The land was tilled, loosed and divided into plots with dimensions of (2x3m) disconnect with 1.5m . Nitrogen fertilizer was added in amount of 120 kg $N.ha^{-1}$ as Uera (46%N) in two doses, the first before sowing and the second at flowering stage, and 40 kg $P.ha^{-1}$ in the form of Tri super phosphate (20%P) before sowing.

A factorial experiment with Randomized Complete Block Design (R.C.B.D) with three replicates were used to evaluate the effect of irrigation practices(continuos and alternating practice) on the performence of four Corn genotypes including : Behoth 106, Talar, AL-Ezz and hybrid 3001 (V1, V2, V3, V4) respectively. Seeds sowing at date 15-7-2000 and 17-7-2001 for two seasons respectively with plant density 50000 plant. ha^{-1} The distance between rows 75cm and 25 cm between the plants within the rows.

All treatments were irrigated twice with river water (1.2 $ds.m^{-1}$) after sowing, afterward treatments irrigated with three salinity water of level (3.0, 6.0, 9.0 $ds.m^{-1}$) which prepared from mixture of drainage water (26.5 $ds.m^{-1}$) and river water (1.2 $ds.m^{-1}$) to bring about the salinity of the water to the required levels table (2)

Alternating irrigation practices used as

A0: continuos irrigation with river water 1.2 $ds.m^{-1}$

A1: two irrigations with river water and one irrigation with salinity water of level.

A13 (3.0 $ds.m^{-1}$)

A16 (6.0 $ds.m^{-1}$)

A19 (9.0 $ds.m^{-1}$)

A2: two irrigations with salinity water and one irrigation with river water as.

A23 (3.0 $ds.m^{-1}$)

A26 (6.0 $ds.m^{-1}$)

A29 (9.0 $ds.m^{-1}$)

Table (1) Some Physical and chemical properties of the farm Soil before Sowing

Physical properties							
Water content% at tension					Separate of Soil particles		
Available water	33 kps	1500 kps	Bulk density Meg.m^{-3}	Soil Texture	Clay	Silt	Sand
					g.kg^{-1}soil		
٢٥,٣	٣٧,٥	١٢,٢	١,٣٧	SiC	٣٣٠	٥٩٠	80

pH*	CEC	gypsum	$CaCO_3$	O. M
	C.mol.kg^{-1}soil	g.kg^{-1}		
٧,٨	٢٤,٠	١٢	٣٠٠	6

Ece and Soluble Cations and Anions																	
2001-2002									2000-2001								
SO_4^{--}	HCO_3	CO_3^{--}	Cl^-	Na^+	K^+	Mg^{++}	Ca^{++}	ECe	SO_4^{--}	HCO_3	CO_3^{--}	Cl^-	Na^+	K^+	Mg^{++}	Ca^{++}	ECe
C mol.kg^{-1}soil								ds.m^{-1}	C mol.kg^{-1}soil								ds.m^{-1}
0.32	٠,٠٣	Nil	0.43	0.24	0.016	0.22	0.31	7.9	٠,٣٠	٠,٠٢	Nil	٠,٤٠	0.22	٠,٠١٥	0.21	0.27	7.2

- **evaluated in the extract of saturated soil paste.**

Plants were irrigated with water to bring the soil moisture to the field capacity when 50% of the available water was depleted as determined by class A pan. The irrigation water quantity was measured by water gauge type Maddalena.

Table (2) Some chemical properties of irrigation water treatments

Soluble Cations and Anions meq / L								Salinity level of irrigation water $ds.m^{-1}$
HCO_3^-	$CO_3^=$	$SO_4^=$	Cl^-	K^+	Na^+	Mg^{++}	Ca^{++}	
4.00	Nil	7.00	0.17	0.10	1.23	5.70	3.80	1.2
10.00	Nil	23.20	0.54	0.12	6.00	18.60	9.80	3.0
10.50	Nil	48.10	0.82	0.13	7.90	37.40	13.70	6.0
10.90	Nil	78.40	1.33	0.32	23.20	50.10	16.70	9.0

At maturity stage the Plants were harvested and evaluated the agronomic traits plant height, dry matter , the yield of (Ear weight, Grain yield , Cob yield) and (oil , protein content)which evaluated according to [11] and [10] respectively.

Soil samples were collected from the plow layer (0-30 cm) for each experimental units after harvest to evaluate the soil salinity as described by [9] .

Data were statistically analyzed using the L.S.D at 0.05 leave as described by [12] .

Results and Discussion

Results in table (3) showed positive effect of irrigation practice on salt concentration and accumulation in the soil. The use of irrigation practice A1 for all its treatments (A13, A16, A19) ,didn't have any significantly effect on salt accumulation during the season 2000-2001. But the use of irrigation practice A2, showed a significant effect on salt accumulation in the soil with increasing reached 3.2, 3.7, 4.8 and 3.5,4.1,5.1 $ds.m^{-1}$ for water salinity levels 3.0, 6.0, 9.0 $ds.m^{-1}$ in the first and second season respectively, which indicated that the increasing in irrigation water salinity effected positively on salt accumulation in the soil, this result was inagreement with the results of [3] and [5].

Therefore the use of irrigation practice A2 caused an increasing in salt accumulation in the soil incase of not using leaching requirements at irrigation, and tobe deprived of adequate river water to leach the salts and reduce its concentration in the root zone for plant.

Results in table (4) showed the effect of irrigation practice and varieties under investigation on plant growth indexed (plant height, dry weight yield).

We was showed a significant deference of irrigation practice effect on the plant height. Treatment A0 showed 7% superiority over the other irrigation practices treatments. On the other hand there was no significant differences between treatments A0 and A13.

Table (3) Soil electrical conductivity after harvesting and its relationship with water salinity and Irrigation practice.

Irrigation practice		Symbol of Treatment	Soil salinity after harvesting	
			2000-2001	2001-2002
			ds.m^{-1}	
Continuous irrigation	Continuous irrigation with river water A0	A0	7.0	7.7
Alternating irrigation	Two irrigations with river water and one irrigation with salinity water according to salinity level of irrigation water A1	A13	7.2	8.0
		A16	7.5	8.3
		A19	7.8	8.6*
	Two irrigation with salinity water according to salinity level and one irrigation with river water A2	A23	10.2**	11.2**
		A26	10.7**	11.8**
		A29	11.8**	12.8**

* LSD 0.05 = 0.82 (for season 2000-2001)

* LSD 0.05 = 0.91 (for season 2001-2002)

** LSD 0.01 = 1.12 (for season 2000-2001)

** LSD 0.01 = 1.14 (for season 2001-2002)

Results in table (4) showed that the treatments A0, A1 and A2 effected plant height significantly.were plant heights reached 179.5, 172.3 and 163.7 cm for A0, A1, and A2 respectively, which indicated that lower values showed in A2 treatments (8.8%). This result was agreed with [13] on corn plant Behoth 106 variety.

The results in table (4) showed no significant differences were obtained between variety V1 (Behoth 106) and variety V3 (Al-Ezz) in plant height that was amounted 177.1 and 175.0 cm respectively. But there is significant differences between varieties V1 and V3 and varieties V2 (Talar) and V4 (hybrid 3001) which gave plant height amounted 161.4 and 165.3 cm respectively.

Prothallus that V2 was gave lower value about this index, the reason was explained to the geneticist differences between the studied varieties. [14] found that statistical differences for varieties respect the geneticist differences resulted from fathers of those used varieties, also the results obtained was agreed with [15] who found same results on the nine corn varieties.

The interaction between irrigation practice and varieties showed a significant difference on the plant height index, This showed the superiority of the treatments A0V1, A0V3 and A13V1 over the other treatments in plant height amounted (186.3 cm) in comparison to A29V2 treatment which gave lower height amounted (151.0cm)

The results in table (4) showed 17% superiority of A0 treatment over the other irrigation practices which gave dry matter yield amounted 4.45 Meg.ha^{-1} as a ratio. Also it was showed significant difference between irrigation practices A1 and A2 that gave dry matter yield 4.09 and 3.01 Meg.ha^{-1} for Al and A2 treatments respectively .which meaning superiority of A1 (35.9%).

The influence of irrigation practice on dry matter yield could be attributed to the increasing the osmotic pressure with increasing the salinity, This has decreased water availability to the plant, addition to nutritional disorder because of competitive action for ions as the result to increasing of some ions concentration [16].

The results in table (4) showed no significant differences were obtained between varieties V1 and V3 which gave dry matter yield amounted 4.45 Meg.ha^{-1} in comparison with V2 and V4 varieties.

The variety V2 gave lower dry matter yield amounted 3.06 Meg.ha^{-1}, and the superiority V1 and V3 varieties in the dry matter yield was prospected because their superiority in plant height property. This result obtained was agreed with [17].

Statistical analysis showed significantly differences between treatments as the result to the interaction between irrigation practice and varieties, which showed superiority the A0V1 treatment that gave yield 5.30 Meg.ha^{-1} in comparison with A29V2 treatment where the latter gave lower value amounted 2.58 Meg.ha^{-1}.

Results in table (5) showed significant differences between treatments about this yield index, the treatment A0 showed superiority over the other irrigation practices treatments, which has given ear weight amounted 165.7 gm/ear as average. also no significant differences were obtained between alternating irrigation treatments A13 and A16 and continuous irrigation treatments A0. which was gave ear weight amounted 155.3 gm/ear as average. But the alternating irrigation treatments A2 gave lower value for this index amounted 124.5 gm / ear as average. This differences could be attributed to the direct and indirect effect of salinity on the plant physiological properties. Also the results in table (5) showed significant differences between the genotypes about ear weight, the variety V1 showed superiority that gave ear weight amounted 172.6 gm/ear as average in comparison with varieties V2 and V4 which gave lower value amounted 120 gm/ear. this difference could be attributed to the geneticist difference between varieties.

The interaction between irrigation practice and varieties also showed significantly difference those showed superiority the treatment A0V1 over the other treatments that gave ear weight amounted 205 gm/ear but the treatments A29V2 and A29V4 gave the lower value amounted 100 gm/ear as average.

Results in table (5) showed significant differences between used irrigation practices. The use of A1 irrigation practice caused decreasing in yield proportion amounted 8.9% as average (2.17, 8.21, 15,94 %) for irrigation treatments with salinity water (3.0, 6.0, 9.0 $ds.m^{-1}$) respectively in comparison with using irrigation practice A2 which caused decreasing in yield for proportion amounted 27.05% as average (15.95, 26.08, 34.54%) for irrigation treatments with salinity water (3.0, 6.0, 9.0 $ds.m^{-1}$) respectively. this result was agreed with [13] who found that the negative affect appeared clearly on corn (Behoth 106) crop growth under alternating irrigation practice as reduction in crop yield with increasing the water salinity level 3.0, 6.0 and 9.0 $ds.m^{-1}$, amounted 7.55, 30.54, 52.53 % respectively in comparison with continuous irrigation with river water 1.5 $ds.m^{-1}$.

Results in table (5) showed significant differences between used irrigation practices on the cob yield $Meg.ha^{-1}$. Also there was no significant difference between alternating irrigation practice A1 and continuous irrigation practice A0 about this property. But using irrigation practice A2 was caused significant increasing in cob yield amounted (12.2% as average) (11.92, 10.51, 14.27%) for treatments A23, A26 and A29 respectively.

Results also showed significant difference between varieties about this index. The variety V2 was gave highest cob yield amounted 1.22 $Meg.ha^{-1}$ as average in comparison with variety V3 which was gave value amounted 1.10 $Meg.ha^{-1}$ as average.

The interaction between irrigation practice and varieties showed that the A0V1 treatment gave lower value reached 1.10 $Meg.ha^{-1}$ as average in compartion with A23V2 treatment which gave highest value reached 1.28 $Meg.ha^{-1}$.

Results in table (6) showed highest protein content was obtained in the using irrigation practice A0 with No significant differences with irrigation practice A1, also there was No significant differences between alternating irrigation practice treatments A13, A16, A19 and A0 treatment. But increasing the number of irrigation with salinity water caused significant decreasing in protein percentage, which was decreased in percentage 4.38, 4.78, 7.76% for

treatments A23, A26 and A29 respectively. The result obtained was agreed with [13] who found that increasing of water salinity alternating irrigation practice from 3 to 9 $ds.m^{-1}$ showed negative effect on protein content in the seeds of corn crop variety Behoth 106, amounted 4, 5, 15% for irrigation water salinity (3.0, 6.0 and 9.0 $ds.m^{-1}$) respectively. The influence of irrigation water salinity on plant growth could be attributed to the reduction in protein content, which was negative effected on corn plant growth and yield [18] .

The results in table (6) showed significant differences between used varieties about this property, which showed superiorety the V1 variety over the other treatments, its gave protein content amounted 10.84% as average (413kg protein. ha^{-1}), but lower value showed in the V2 variety amounted 8.84% as average (286kg protein.ha^{-1}), this result obtained was agreed with [19] who found that the ecological effects was highest effected than the genetics factor on the protein content in the corn varieties.

Also the results showed superiorety the A0V1 treatment in protein percentage reached 11.2% incomparison with A29V2 treatment which gave lower value amounted 8.2%.

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Results in table (6) showed no significant differences between treatment about effect the irrigation practice or irrigation water salinity on oil percentage in the seeds. this result obtained was agreed with [20] who found no significant effect for increasing salinity to 10.2 $ds.m^{-1}$ on the oil percentage in sun flower crop. Also we can see from the results in above table significant differences between studied varieties about oil content, this different was attributed to the genetical differences between varieties.

The results were similar to the results obtained by [21] who reported that the gentical effects have highest role incomparison to the ecological effects on oil content in corn varieties, The results showed that the varieties V1 and V3 was gave highest oil percentage amounted 4.02% as average (153kg oil.ha^{-1}). But the varieties V2 and V4 gave lower value for oil percentage amounted 3.92% as average (128.7kg oil .ha^{-1}).

Results in table (7) showed that the volume of the water requirement for corn crop during growth season was 8918 m^3/ha, and the use of alternating irrigation practice Al (two irrigations with river water and one irrigation with salinity water) from which we could save a proportion of 28.57% of fresh water which is equal to 2548 $m^3.ha^{-1}$ from the volume of the water required for corn crop during growth season. But using the alternating irrigation practice A2 (two irrigations with Salinity water and one irrigation with river water) Showed we can save aproportion of 57.15% of fresh water which is equal to5096 m^3. ha^{-1} from the volume of the water requirement for crop. although the proportion of saved fresh water at the applying the alternating irrigation practice A2 was equal a doubled volume in comparison with applying the irrigation practice A1, but we don't advice to use (A2) because it causes increasing in soil salt content according to salt concentration in the using irrigation water. therefore we advice to use the alternating irrigation practice (A1).

Table (4) Effect of irrigation practice and variety on plant growth indexes
(plant height and dry matter yield of plant aerial part)

Symbol of irrigation irrigation	Symbol of treatment	Plant height (cm)					Dry matter yield of plant Meq . ha^{-1}				
		2000-2001	Mean	2001-2002	Mean	The average of V	2000-2001	Mean	2001-2002	Mean	The average of V
A0	A0V1	188	179	186	179.5	187	5.30	4.45	5.08	4.41	5.19
	A0V2	170		172		171	3.42		3.40		3.41
	A0V3	186		185		186	5.00		5.07		5.03
	A0V4	172		175		173	4.07		4.10		4.08
A13	A13V1	186	176	185	174.5	186	5.25	4.25	5.18	4.26	5.21
	A13V2	165		164		165	3.20		3.25		3.22
	A13V3	183		180		182	4.72		4.75		4.73
	A13V4	170		169		170	3.82		3.88		3.85
A16	A16V1	183	172.2	180	172.2	182	5.07	4.04	5.00	4.08	5.03
	A16V2	162		165		164	3.15		3.20		3.17
	A16V3	176		174		175	4.34		4.50		4.42
	A16V4	168		170		169	3.60		3.64		3.62
A19	A19V1	175	168.5	173	168.2	174	5.10	3.99	5.20	4.01	5.15
	A19V2	160		161		161	3.10		3.18		3.14
	A19V3	174		175		175	4.17		4.06		4.11
	A19V4	165		164		165	3.62		3.60		3.61
A23	A23V1	172	166.2	170	165.5	171	4.85	3.76	4.90	3.89	4.87
	A23V2	159		157		158	3.00		3.20		3.10
	A23V3	172		170		171	3.95		4.00		3.97
	A23V4	162		165		164	3.56		3.47		3.51
A26	A26V1	172	164.2	171	165.7	172	3.76	3.40	3.70	3.37	3.73
	A26V2	156		159		158	2.90		3.00		2.95
	A26V3	170		172		171	3.62		3.55		3.58
	A26V4	159		161		160	3.32		3.22		3.27
A29	A29V1	166	158.7	169	160.5	168	3.60	3.21	3.56	3.19	3.58
	A29V2	150		151		151	2.58		2.56		2.57
	A29V3	164		165		165	3.50		3.40		3.45
	A29V4	155		157		156	3.17		3.25		3.21
LSD 0.05 LSD 0.05 LSD 0.05	for irrigation practice for variety for interaction	4.168 3.066 8.327		3.310 3.250 8.621			0.310 0.563 0.421		0.298 0.551 0.399		

Table (5) Effect of irrigation practice and variety on yirld contents.

Symbol of Irrigation irrigation	Symbol of treatment	Ear Wight (gr)					Grain yield Meq.ha^{-1}					Cob yield Meq .ha^{-1}				
		2000-2001	Mean	2001-2002	Mean	The average of V	2000-2001	Mean	2001-2002	Mean	The average of V	2000-2001	Mean	2001-2002	Mean	The average of V
A0	A0V1	208	165.5	202	166.0	205.5	4.38	4.18	4.25	4.12	4.31	1.02	1.07	1.01	1.06	1.01
	A0V2	127		130		128.5	3.92		3.90		3.91	1.12		1.09		1.10
	A0V3	190		192		191.0	4.31		4.22		4.26	1.06		1.07		1.07
	A0V4	137		140		138.5	4.12		4.10		4.11	1.08		1.08		1.08
A13	A13V1	193	157.7	190	157.2	191.5	4.29	4.07	4.19	4.03	4.24	1.00	1.06	1.00	1.05	1.00
	A13V2	131		132		131.5	3.74		3.70		3.72	1.07		1.05		1.06
	A13V3	173		175		174.0	4.23		4.22		4.23	1.06		1.07		1.07
	A13V4	134		132		133.0	4.03		4.00		4.02	1.09		1.10		1.10
A16	A16V1	187	153.5	190	152.5	188.5	4.08	3.83	4.00	3.78	4.04	1.08	1.12	1.10	1.13	1.09
	A16V2	129		125		127.0	3.57		3.60		3.59	1.21		1.20		1.21
	A16V3	170		169		169.5	4.01		3.98		3.99	1.08		1.09		1.09
	A16V4	128		126		127.0	3.56		3.55		3.60	1.12		1.14		1.13
A19	A19V1	177	147.7	180	189.7	178.5	3.94	3.48	3.96	3.48	3.95	1.20	1.18	1. 18	1.17	1.19
	A19V2	123		125		124.0	3.38		3.40		3.39	1.31		1.30		1.31
	A19V3	164		165		164.5	3.31		3.35		3.33	1.08		1.10		1.09
	A19V4	127		125		126.0	3.30		3.20		3.25	1.14		1.12		1.13
A23	A23V1	156	133.5	160	135.2	158.0	3.58	3.72	3.55	3.29	3.57	1.21	1.19	1.20	1.18	1.21
	A23V2	118		120		119.0	2.90		3.05		2.97	1.30		1.26		1.28
	A23V3	148		146		147.0	3.50		3.42		3.46	1.11		1.10		1.11
	A23V4	112		115		113.5	3.12		3.14		3.13	1.16		1.17		1.17
A26	A26V1	148	124.0	150	123.5	149.0	3.39	3.06	3.41	3.07	3.40	1.21	1.18	1.20	1.17	1.21
	A26V2	112		110		111.0	2.72		2.80		2.76	1.28		1.25		1.26
	A26V3	131		130		130.5	3.29		3.31		3.30	1.11		1.10		1.11
	A26V4	105		104		104.5	2.85		2.75		2.80	1.14		1.12		1.13
A29	A29V1	140	116.7	136	114.0	138.0	3.18	2.72	3.20	2.70	3.19	1.23	1.21	1.20	1.21	1.22
	A29V2	102		100		101.0	2.38		2.31		2.34	1.31		1.30		1.31
	A29V3	125		122		123.5	2.96		3.00		2.98	1.13		1.15		1.14
	A29V4	100		98		99.0	2.35		2.29		2.32	1.19		1.20		1.20
LSD 0.05	for irrigation practice	12.098		12.358			0.323		0.372			0.121		0.128		
LSD 0.05	for variety	8.221		8.586			0.212		0.227			0.073		0.085		
LSD 0.05	for interaction	22.630		22.716			0.431		0.454			0.215		0.234		

Table (6) Effect of irrigation practice and variety on quality properties of Crops

Symbol of Irrigation irrigation	Symbol of treatment	Protein percentage					oil percentage				
		2000-2001	Mean	2001-2002	Mean	The average of V	2000-2001	Mean	2001-2002	Mean	The average of V
A0	A0V1	11.00	9.99	11.40	10.09	11.20	4.15	4.03	4.07	3.98	4.11
	A0V2	9.00		8.90		8.95	3.96		3.92		3.94
	A0V3	10.12		10.28		10.20	4.10		4.06		4.08
	A0V4	9.86		9.78		9.89	3.92		3.88		3.90
A13	A13V1	10.95	9.91	11.05	10.03	11.00	4.13	4.04	4.07	3.79	4.10
	A13V2	8.90		9.02		8.96	3.98		3.92		3.95
	A13V3	10.00		10.20		10.10	4.05		3.99		4.02
	A13V4	9.80		9.84		9.82	4.00		3.90		3.95
A16	A16V1	10.96	9.98	11.04	9.93	11.00	3.98	3.79	4.02	3.98	4.00
	A16V2	9.00		8.88		8.94	3.96		3.92		3.94
	A16V3	10.12		10.08		10.10	4.00		4.04		4.02
	A16V4	9.86		9.74		9.80	3.95		3.93		3.94
A19	A19V1	10.85	9.88	10.95	9.92	10.90	3.98	3.79	4.02	3.97	4.00
	A19V2	9.96		8.86		8.91	3.95		3.91		3.93
	A19V3	9.90		10.10		10.00	4.00		4.06		4.03
	A19V4	9.80		9.76		9.78	3.95		3.91		3.93
A23	A23V1	10.72	9.55	10.88	9.64	10.80	4.01	3.97	3.97	3.94	3.99
	A23V2	8.53		8.45		8.50	3.95		3.91		3.93
	A23V3	9.65		9.75		9.70	3.97		4.03		4.00
	A23V4	9.30		9.50		9.40	3.95		3.85		3.90
A26	A26V1	10.65	9.55	10.45	9.56	10.80	3.96	3.98	4.00	3.93	3.98
	A26V2	8.55		8.35		8.45	3.95		3.93		3.94
	A26V3	9.72		9.62		9.67	4.00		3.98		3.99
	A26V4	9.30		9.34		9.32	4.00		3.80		3.90
A29	A29V1	10.18	9.31	10.22	9.21	10.20	3.96	3.94	4.04	3.97	4.00
	A29V2	8.26		8.14		8.20	3.93		3.87		3.90
	A29V3	9.50		9.34		9.42	3.97		4.03		4.00
	A29V4	9.30		9.16		9.23	3.90		3.94		3.92
LSD 0.05	for irrigation practice	0.143		0.146			0.077		0.083		
LSD 0.05	for variety	0.455		72			0.048		0.052		
LSD 0.05	for interaction	1.099		1.115			0.118		0.112		

Table (7) The relationship between irrigation practice and the volume of river water which we can save

Proportion of saved fresh water %	Volume of salinity water which is used in irrigation during growth season $m^3.ha^{-1}$	Volume of river water which is used in irrigation during growth season $m^3.ha^{-1}$	Treatments
-	-	8918	Continuous irrigation A0
28.57	2548	6370	Alternating irrigation (two irrigations with river water and one irrigation with salinity water of level. (2.0, 6.0, 9.0 $ds.m^{-1}$) (A13, A16, A19)
57.14	5096	3822	Alternating irrigation (two irrigations with salinity water of level (3.0, 6.0, 9.0 $ds.m^{-1}$) and one irrigation with river water (A23, A26, A29)

* The Number of irrigation during every growth season were(14)

Conclusions and Recommendations

1 - The results ot two experiments were indicake that using of A13 and A16 irriganion practices were Showed vary good growth and yield indexs for cultavated crop but using Salinity imigation water higher than 6dsim-1 was cansed bad effects on crop , which means we needed to using leaching requirement regarding to avoid Salt accumulation in the Soil .
2- using prach A1 was concluuded save about 28.57% of fresh water .
3-For the above reasons we recommendation to use practice A1 for irrigahion and avoidance using practice A2 with out leaching requirement .

4-We advice to use Behoth 106 and al-Ezz genotypes because there Superiority in growth and yield indexes.

5-Replaced this study at non Salinity Soils , to Know its effects on Soil properties with time .

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