ISSN 2349-0837

Evaluation the effect of irrigation water salinity and Fusarium fungi on seven safflower cultivars

Behnam Tahmasebpour[1] *, Alireza Babazade[2]

1.Department of Agronomy and plant breeding ,faculty of Agricultural Engineering and Technology , Collage of Agriculture and Natural resources, University of Tabriz , Tabriz , Islamic republic or Iran .

*Author for correspondence (Email : tahmasbpor@yahoo.com)

2. plant Biotechnology University of Tabriz.

Abstract

In order to study the effect of Salinity levels of Sodium chloride and Soil type on the characteristics of some grown seeds and the resistance rate of Fusarium fungi (quantitative length evaluation of necrotic part in plants gorget) in biotypes of safflowers, an experiment was factorically conducted by using two salinity levels of sodium chloride (20% and 50% salinitys), seven biotypes of acanaceous and non-acanaceous safflowers (Iraqi 222, IL111, K.H.64.68, and Varamin 295,Local Isfahan , Padideh and 340779), two types of soil (clay sandy-clay), in a three times randomized complete block design. The variance analyzing results showed that between the levels of all factors, there was meaningful difference for 2 studied characteristics. According to the results obtained from the comparison of factors means, genotypes of Iraqi 222, K.H.64.68 and 340779 under the condition of 20% salinity and genotype of Iraqi 222 under the condition of 50% salinity contained the most numbers of grown seeds. On the other hand the most resistance rate against Fusarium mushrooms was related to genotype K.H.64.68 under the condition of clay soil and 20% salinity, genotype IL111 under the condition of clay soil and 50% salinity and local genotype of Isfahan under the condition of sandy-clay soil with 20% salinity, Based on the results obtained from the linear regression and simple correlation coefficient there was positive and meaningful correlation between two evaluated characteristics in the probability level of 1% and the relation between them was estimated as linear and positive one (y=0/545+0/234X), where X refers to the number of grown seeds and y refers to the resistance against Fusarium.

Key words: Fusarium fungi; Irrigation water salinity; safflower

Council for Innovative Research

Peer Review Research Publishing System

Journal: JOURNAL OF ADVANCES IN AGRICULTURE

Vol 1, No. 1

editor@cirworld.com

www.cirworld.com

ISSN 2349-0837

Introduction

Due to supplying most of consumable oil from foreign resources and regarding population increasing and annual oil consumption of country, increase of cultivation level and oil seeds production is very important. Safflowers are among those oil seeds which have high resistance against dry and saline soil conditions and can be cultivated in dry and semi-dry regions (Alyari etal, 2000, Naseri, 1997). Although safflowers are Iranian local plants and their wild species are found more in Iran (Ahmadi and Omid Tabrizi, 1997). They haven't been enough focused and fewer studieds have been made on them.

Safflowers are classified into two groups based on their oil quality. The first group includes those types that contain oil with high Oleic acid which are resistant in high temperature and did n't smell awful after frying and are used in the kitchen consumptions (Ahmadi and omidi Tabrizi ,1997). Second group are those types with high CLA whose oil isn't resistant in high temperature. Those types with less Oleic acid and unsaturated fatty acid have been commercially more focused (Khajeh Pour, 1997).

Safflowers are able to absorb moisture in 3-4 deep meters of soil due to their long roots. Dying plants is one of the important diseases of Safflowers in Isfahan.

The results of conducted experiments in Isfahan showed that the reason of that disease in the region is *Fusarium solani* fungi and there was meaningful difference between biotypes regarding their reflection against the disease (Sharif Nabi and Saeedi, 2004). The fungi causes the safflower root decay (*Alternaria carthmin*) and (*Verticillium dahliae*) and dying plants disease (*Puccinia carthami*). Signs of this disease includes the initial yellowing leaves and dejection and then the plant full death. The roots of infected plants change their colors and are decayed.

The above researches were conducted as an introduction to study the resistance against Fusarium decaying, so by studying the genetic variety in comparing to the resistance against Fusarium decaying disease and the selection of the best types to interact, the possibility of producing resistant lines is provided in the later plans (Sharif Nabi and Saeedi, 2004).

In experiment which was factorially conducted in two phase and by the use of 4 salinity levels of sodium chloride (15, 10, 5, 0 ppm) and 4 types of acanaceous and non-acanaceous safflowers (local Isfahan and improved types LRV, IL, PI) and in a complete randomized design with three repetitions, the results of both phases showed that in all types the salinity tension decreased meaningfully all of the mentioned characteristics, and also the mutual effect of salinity and type was significant in growing phase despite of seedlings growth (Mahdieh et al, 2007). In the above experiment, by salinity increasing, the resistance index against salinity decreased significantly in both phases, but the difference between varieties wasn't meaningful (Mahdieh et al, 2007). Due to the importance of local masses and improved types and the necessity of genetic variety in eugenic programs, this experiment was conducted to study the resistance against Fusarium fungi and seeds growing ability and also the relation between the evaluated characteristics of safflowers.

Materials and Methods:

In order to evaluate the effect of salinity level of sodium chloride and soil type, and experiment was factorically conducted by using two salinity levels (50% and 20% salinity), seven acanaceous and non-acanaceous biotypes (Iraqi 222, IL111, K.H.64.68, Varamin 295, Local Isfahan, Padideh and 340779), two types of soil (clay, sandy-clay) in a complete randomized block design with three blocks. The characteristics including seed growing percentage (the number of growing seeds from 4 seeds planted in vase) and the resistance against Fusarium fungi (the quantitative study of necrotic zone length in the plant) were evaluated.

In order to analyze the data statistically (Variance analysis, the comparison of treatments mean, correlation and regression) the MSTATC and SPSS software were used.

Also in order to draw the diagrams, **SPSS** software was used.

Results and Discussion

Variance analysis and comparison of characteristics mean:

As shown in Table 1, it is seen that there is meaningful different in between the probability levels of 1% regarding the number of grown seeds characteristics between the levels of all factors and even their mutual effect; but in term of resistance rate feature against Fusarium fungi, the factors of soil type, the salinity rate and soil type X salinity rate there is meaningful difference in the probability level of 5%. It means that regarding two studied features between the level of all factors there is meaningful difference. The bolock factor is meaningful regarding both feature in the 1% probability level. According to table 2, the most number of growing seeds was of Irak genotype Iraqi 222 and the least one was of Isfahan local genotype. But regarding the resistance rate feature against Fusarium fungi genotype K.H.64.68 had the highest rate and Padideh and Varamin 295 had the least one.

Table 3 shows that the most number of grown seeds are related to the condition of clay soil with 20% salinity, however ; the least one is related to the sandy-clay soil condition. Regarding the resistance rate feature against Fusarium fungi, the clay soil condition with 50% salinity caused the highest plant resistance, but the other conditions caused the least plant resistance.

According to table 4, the highest number of grown seeds is related to clay soil condition and Iraqi 222and the least one is of clay-sandy condition and Isfahan local. Regarding the resistance rate feature against Fusarium fungi, the highest rate is related to clay soil condition and Iraqi 222, IL 111 ,

K.H. 64.68 and the least one is of the elay soil and clay-sandy soil condition and Varamin 295 and Padideh.

According to table 5, under the condition of 20% salinity, Iraqi 222 has the most number of grown seeds. However under the condition of 20% salinity, genotype K.H.64.68 and under the 50% salinity condition genotype IL 111 have the highest rate of resistance against Fusarium fungi.

According to the above information it is concluded that Iraqi 222, K.H.64.68 and 340779 under the 20% salinity condition and Iraqi 222 under the 50% salinity condition had the most number of grown seeds. On the other hand, the highest resistance rate against Fusarium fungi was related to genotype H.K.64.68 under the condition of clay soil with 20% salinity, and genotype IL111 under the condition of clay soil with 50% salinity and Isfahan local genotype under the condition of clay-sandy soil with 20% salinity (table 6).

The experiment conducted by Mahdiyeh and et al (2007) showed that in all types, the salinity tension decreased the mentioned features meaningfully. Also the mutual effect of salinity and type in growing phase was meaningful despite of seedlings growth and the resistance index against salinity decreased meaningfully in both phases by salinity increasing, but the difference between varieties wasn't meaningful (Mahdiyeh and et al 2007).

The correlation and Regression of evaluated characteristics

The simple coefficient correlation for studied characteristics showed that there is positive and meaningful correlation between the characteristic number of grown seeds and resistance rate against Fusarium fungi in the 1% probability level (Table 7 and 8).

It means that the resistance rate against Fusarium fungi is increased by increasing the number of grown seeds.

The results of linear regression analysis (table 9) showed that there is meaningful relation between two studied features as the following equation:

Y=0/545+0/234X

(independent variable) X= number of grown seeds

(dependent variable) y= the resistance rate against Fusarium fungi.

The given equation shows that the resistance rate against Fusrium fungi increases by increasing the number of growing seeds and seeds growing ability.

Table1.Analysis of variance of different characteristics on safflower cultivars evaluated

Means of square			
the resistance against Fusarium fungi	the number of growing seeds	df	Source of Variation
2/286**	2/883**	2	Replication
0/429*	35/412**	1	Kind of soil
0/429*	3/663**	1	salinity levels
0/429*	3/663**	1	Kind of soil* salinity levels
6/179**	10/156**	6	Genotyp
1/679**	5/580**	6	Genotyp*Kind of soil
2/179**	5/018**	6	salinity levels*Genotyp
3/679**	3/275**	6	Kind of soil* salinity levels*Genotyp
0/063	%62	54	error
%27/14	%15/13		Coefficient of variation(C.V.)

** **significant at level** %1

ISSN 2349-0837

Table2.Comparison of the mean characteristics of the genotyps studied Safflower with Duncan test.

the resistance against fusarium fungi	the number of growing seeds	Genotype
$1/5^{b}$	$2/75^{a}$	Iraqi 222
$1/5^{b}$	$2/50^{b}$	IL111
$1/75^{a}$	$1/75^{d}$	K.H.64.68
0^{e}	$1/29^{e}$	Varamin 295
1^{c}	0^{f}	Local Isfahan
0^{e}	$1/25^{e}$	Padideh
$0/75^{d}$	2^{c}	340779

Different letters in each column indicate a significant level of 5% is likely.

Table3.Effect kind of soil and salinity levels on evaluated traits

the resistance against Fusarium fungi	the number of growing seeds	salinity levels	Kind of soil
$0/86^{b}$	$2/72^{a}$	20% salinity	clay
$1/14^{a}$	$1/88^{b}$	50% salinity	
$0/86^{b}$	1^{c}	20% salinity	sandy-clay
$0/86^{b}$	1^{c}	50% salinity	

Different letters in each column indicate a significant level of 5% is likely.

ISSN 2349-0837

Table4.Effect kind of soil and genotype on evaluated traits

the resistance against Fusarium fungi	the number of growing seeds	genotype	Kind of soil
2^{a}	4^{a}	Iraqi 222	
2^{a}	3^{c}	IL111	
2^{a}	3^{c}	K.H.64.68	
0^{e}	1/08[f]	Varamin 295	
$0/5^{d}$	0^{h}	Local Isfahan	clay
0^{e}	$1/5^{e}$	Padideh	
$0/5^{d}$	$3/51^{b}$	340779	
1^{c}	$1/5^{e}$	Iraqi 222	
1^{c}	2^{d}	IL111	
$1/5^{b}$	$0/5^{g}$	K.H.64.68	
0^{e}	$1/5^{e}$	Varamin 295	
$1/5^{b}$	0^{h}	Local Isfahan	sandy-clay
0^{e}	1^{f}	Padideh	
1^{c}	$0/5^{g}$	340779	

Different letters in each column indicate a significant level of 5% is likely

ISSN 2349-0837

Table5.Effect salinity levels and genotype on evaluated traits

the resistance against Fusarium fungi	the number of growing seeds	genotype	salinity levels
$1/5^{b}$	$3/5^{a}$	**Iraqi 222**	
1^{c}	$2/5^{b}$	**IL111**	
2^{a}	2^{c}	**K.H.64.68**	
0^{e}	$0/5^{e}$	**Varamin 295**	**%20 salinity**
$1/5^{b}$	0^{f}	**Local Isfahan**	
0^{e}	$2/5^{b}$	**Padideh**	
0^{e}	2^{c}	340779	
$1/5^{b}$	2^{c}	**Iraqi 222**	
2^{a}	$2/5^{b}$	**IL111**	
$1/5^{b}$	$1/5^{d}$	**K.H.64.68**	
0^{e}	$2/08^{c}$	**Varamin 295**	**%50 salinity**
$0/5^{d}$	0^{f}	**Local Isfahan**	
0^{e}	0^{f}	**Padideh**	
$1/5^{b}$	2^{c}	340779	

Different letters in each column indicate a significant level of 5% is likely

ISSN 2349-0837

Table6.Effect salinity levels and kind of soil on safflower cultivars evaluated

the resistance against Fusarium fungi	the number of growing seeds	Genotype	salinity levels	Kind of soil
2[b]	4^{a}	Iraqi 222		
1[c]	3^{b}	IL111		
3[a]	4^{a}	K.H.64.68		
0[d]	1^{d}	Varamin 295		
0[d]	0^{e}	Local Isfahan	%20 salinity	clay
0[d]	3^{b}	Padideh		
0[d]	$4/01^{a}$	340779		
2^{b}	4^{a}	Iraqi 222		
3^{a}	3^{b}	IL111		
1^{c}	2^{c}	K.H.64.68		
0^{d}	$1/17^{d}$	Varamin 295		
1^{c}	0^{e}	Local Isfahan	%50 salinity	Clay
0^{d}	0^{e}	Padideh		
1^{c}	3^{b}	340779		
1^{c}	3^{b}	Iraqi 222		
1^{c}	2^{c}	IL111		
1^{c}	0^{e}	K.H.64.68		
0^{d}	0^{e}	Varamin 295		
3^{a}	0^{e}	Local Isfahan	%20 salinity	sandy-clay
0^{d}	2^{c}	Padideh		
0^{d}	0^{e}	340779		

ISSN 2349-0837

1^{c}	0^{e}	**Iraqi 222**		
1^{c}	2^{c}	**IL111**		
2^{b}	1^{d}	**K.H.64.68**		
0^{d}	3^{b}	**Varamin 295**		
0^{d}	0^{e}	**Local Isfahan**	**%50 salinity**	**sandy-clay**
0^{d}	0^{e}	**Padideh**		
2^{b}	1^{d}	340779		

Different letters in each column indicate a significant level of 5% is likely

Table7. Pierson correlation coefficients of evaluated traits

the resistance against Fusarium fungi	the number of growing seeds	Trait
0/342**	1	the number of growing seeds
1	0/342**	the resistance against fusarium fungi

*and** significant at level %5 and %1,respectively.

Table8. Spirman correlation coefficients of evaluated traits

the resistance against Fusarium fungi	the number of growing seeds	Trait
0/338**	1	the number of growing seeds
1	0/338**	the resistance against fusarium fungi

*and** significant at level %5 and %1,respectively.

Table9.results of liner regression analysis of evaluated traits

Means of square	df	Source of Variation
10/713**	1	regression
0/986	82	remain
1/103	83	total

*and** significant at level %5 and %1,respectively.

References:

- Ahmadi, M. Omidi Tabrizi H. A.V. R, .1997. Study the performance of seed and the effect of harvest time on the oil rate of spring and fall safflowers types, Iran Agricultural science magazine, volume 27, no: 4. Pp. 29-36.

- Alyari, h.F, Shekari and F. Shekari .2000. Oil seeds, agriculture and physiology, Amidi publication, Tabriz.

- Khajeh Pour, M.P. 1997. The production of industrial plants, the publication of Isfahan Jahadeh Daneshgahi.

- Mahdieh, H. G and Safari, M and Magsoudi, A.A (2007). The effect of salinity different levels of sodium chloride on safflowers growing and their seedlings growth (Cartamus tinctorius L.) soil and water science magazine- The techniques and science of agriculture and natural resources 458- 449: 12(45).

- Naseri, F. (1997) oil seeds, Astaneh Godseh Razavi Pubication.

- Sharif Nabi, B. Saeedi, G, .2004. The primary study of safflowers bibtypes (Litinctorious Carthamus) in comparing to fusarium dying plants disease. Water and soil science magazine – Techniques and sciences of agriculture and natural sources. 227-219: 8(3).