

## **Effect of Salinity on Seed Germination of Wheat Cultivars**

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### **Abstract**

Wheat (*Triticum aestivum* L.) is rated as moderately salt tolerant . Nevertheless, salinity reduces germination and delays emergence in this species and stands tend to be irregular with depressed crop yield. Some varieties, however, are less affected by salinity than others. In this study, our objective was to determine the effects of salinity on germination of a range of commercially available wheat cultivars. To accomplish this, we examined the effects of salinity (0, -0.32, -0.56, and -0.80 Mpa - established with NaCl in deionized water) on germination of four cultivars of bread wheat in vitro. Fifty seeds of each cultivar were placed on pre-moistened germination paper in petri dishes, and placed in growth chambers at 20 °C. Germination was scored during 10 days after seed placement. The experiment was a completely randomized design with four replications. Germination percentage and rate, root and shoot length, root and shoot dry weight were investigated. The results showed that the values for the investigated traits were diminished with increasing soil salinity in all cultivars. Among the varieties, the highest emergence rate, root length and shoot length were occurred in the cv. Sardari. But the root dry weight and shoot dry weight were highest in the cvv. Taro and Chamran respectively. If the cultivation of wheat on saline soils is required, Sardari and Chamran cultivars should be preferred in dryland and irrigation conditions, respectively.

### **Key words**

Salinity, Germination, Wheat.

### **Introduction**

Salinity is a widespread problem around the world. Seed germination and seedling growth of wheat (*Triticum aestivum* L.), like other crops, are negatively affected by salinity stress ([Hampson and Simpson, 1990](#)). Poor germination and decreased seedling growth result in poor crop establishment. Poor crop establishment in turn causes decreased crop competitiveness with weeds; lower shading of the soil surface and subsequently higher loss of soil water through evaporation and hence, lower crop water availability ([Condon et al., 1993](#)).

The aim of the present study was to investigate effect of salinity on seed germination of conventional wheat cultivars.

### **Materials and methods**

We examined the effects of salinity (0, -0.32, -0.56, and -0.80 Mpa (equivalent NaCl concentrations? - established with NaCl in deionized water) on germination of four cultivars (Zagros, Sardari, Chamran, Taro) of bread wheat in vitro. Fifty seeds of each cultivar were placed on pre-moistened germination paper in petri dishes, and placed in growth chambers at 20 °C. Germination was scored during 10 days after seed placement. The experiment was a completely randomized design with four replications. Germination percentage and rate, root and shoot length, root and shoot dry weight were investigated.

Data from this experiment was analysed, using the GLM procedure of the statistical analysis system ([SAS Institute, 1989](#)).

### **Results and discussion**

There were no significant interactions between the effects of salinity and cultivar ( $p>0.05$ ) on all traits. The results showed that salinity had a significant effect on germination percentage and rate, root and shoot length, root and shoot dry weight ( $p<0.05$ ). The values for germination percentage and rate, root and shoot length, root and shoot dry weight decreased with increasing soil salinity in all cultivars (Table 1). This is in agreement with the observation by [Soltani et al. \(2002\)](#) in wheat.

Across salinity levels, the difference between cultivars was not significant for germination percentage and rate ( $p>0.05$ ). However, among the varieties, the highest emergence rate, root length and shoot length occurred in the cv. Sardari. But the root dry weight and shoot dry weight were highest in cvv Taro and Chamran (Table 1).

The results of this investigation indicate that the the Sardari and Chamran cultivars should be preferred in dryland and irrigation conditions, respectively.

**Table 1. Effects of salinity on germination and seedling growth in four wheat cultivars.**

Treatments	Root length (cm)	Shoot length (cm)	Root dry weight (gr)	Shoot dry weight (gr)	Germination percentage	Germination rate
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**(a) Across all cultivars**

Salinity (Mpa)	Root length (cm)	Shoot length (cm)	Root dry weight (gr)	Shoot dry weight (gr)	Germination percentage	Germination rate
0	7.49a	8.86a	0.144a	0.226a	100a	8.32a
-0.32	6.93b	6.06b	0.138a	0.196b	99a	7.72a
-0.56	5.99c	5.79b	0.110b	0.164c	1/98a	5.59b
-0.80	4.69d	5.34b	0.107b	0.112d	94.8b	5.45b

**(b) For each cultivar across all salinity levels**

Cultivar	Root length (cm)	Shoot length (cm)	Root dry weight (gr)	Shoot dry weight (gr)	Germination percentage	Germination rate
Zagros	5.37c	6.28b	0.129a	0.166b	99.2a	6.74a
Sardari	7.94a	7.67a	0.094b	0.192a	97.5a	7.02a
Chamran	6.86b	7.69a	0.134a	0.176ab	97.2a	6.74a

Taro	5.37c	5.33c	0.141a	0.162b	97.2a	6.75a
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Means within a population that have different letters are significantly different at  $P<0.05$ .

### Conclusion

Overall, our results indicate that, on saline soils, Sardari and Chamran cultivars should be preferred in dryland and irrigation conditions, respectively.

### References

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