

## SALT TOLERANCE OF SUNFLOWER VARIETIES (*HELIANTHUS ANNUUS L.*) DURING GERMINATION

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### ABSTRACT

Effects of seven salinity levels (0 to 2% NaCl) on germination of four varieties of sunflower (*Helianthus annuus L.*) were determined under controlled temperature ( $30 \pm 2C$ ). The varieties were Hybrid 52, Hybrid 53, Record, and Armaveric. The four varieties showed a similar trend in germination reduction as salinity increased from 0 to 2% NaCl. There were no significant differences among varieties in relation to salinity. However, NaCl concentration greater than 0.2 percent reduced the germination of the four varieties significantly.

### INTRODUCTION

Sunflower (*Helianthus annuus L.*) is an oil crop which has gained considerable attention in the world vegetable oil market. The development of high oil content varieties, and the potential of the seed as a protein source have been the reason for increased interest. World production of sunflower in 1972 is forecasted at record high of nearly 3.8 million tons, or about 6 percent above the estimated 1971 volume. In 1971, the area under cultivation in Iran was 110,000 ha with the average yield of 700 kg/ha. Accumulation of salts in irrigated soils of sunflower fields in Iran may reduce the germination, growth and finally the yield of this crop. Oertili (9) and Oertili and Richardson (10) studied the effect of external salt concentration on the water relationship of the sunflower seedlings. Imre (8) has studied the salt tolerance of sunflower and other plants. However, the review of literature showed, no report on the variation among sunflower varieties to salinity. Differences in salt tolerance of varieties of a given crop have been reported by several investigators (1, 2, 3, 5, 6, 7). Several reviews (4, 11) indicated that one of the initial stages for selecting salt tolerant varieties is germination. The objective of this experiment was to determine the response of sunflower varieties to different salinity levels during germination.

### MATERIALS AND METHODS

Four varieties of sunflower: Hybrid 52, Hybrid 53, Record and Armaveric, were used in this study. A preliminary experiment was first conducted to determine the germination of four varieties. For this purpose duplicate samples of 30 seeds of each variety, were placed on wet filter paper in sterilized petri-dishes in a germinator at  $30 \pm 2C$ . The number of germinating seeds was counted every day. The time required for the maximum percentage of germination for the four varieties was five days. The percentage of germination at the end of 5 days was between 83-85% for the four varieties.

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## NOTE

A germination experiment was conducted with the four mentioned varieties at seven concentrations of NaCl: 0, 0.1, 0.2, 0.5, 0.7, 1.0, and 2.0%. The design of the experiment was a split-plot (varieties as the main plot) with three replications. Thirty seeds of each variety were placed on a filter paper in sterilized petri-dishes. Seeds were treated with 10% solution of "Clorax" as surface disinfectant for three minutes before placement on filter papers. The zero treatments were moistened with double distilled water and the other treatments with their assigned NaCl solutions. The petri-dishes were placed in a germinator for 5 days at  $30 \pm 2C$  and after 5 days the percentage of germination was determined.

## RESULTS AND DISCUSSION

The germination of four sunflower varieties, averaged over all salinity treatments were 54.1, 52.4, 62.2 and 58.6 per cent for hybrid 52, hybrid 53, Record and Armaveric, respectively. The result of the experiment showed that there were no significant differences among the varieties in relation to salinity. The lack of variation among varieties may be due to the fact that four varieties used in this experiment were selected under the soil condition of Eastern Europe where salinity is not a problem.

The general trend of germination reduction due to increase in salinity was the same for all four varieties. The data showed, that NaCl concentration greater than 0.2 per cent reduced the germination of all varieties (Table 1).

In summary, our data indicated that sunflower had rather low tolerance to salinity and there was no variation in salt tolerance among the four sunflower varieties studied.

Table 1. The percentage of germination of Sunflower at different levels averaged overall varieties.

NaCl Concentration %	Germination %
0.0	82.3 <sup>2</sup> a
0.1	80.5 a
0.2	75.5 a
0.5	67.0 b
0.7	50.3 c
1.0	41.3 d
2.0	0.3 e

2. Means followed by the same letter are not significantly different at 5% level of probability (Duncan's multiple range test).

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