

Evaluation of different sunflower (*Helianthus annuus* L.) genotypes for sodium chloride induced salinity

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Several sunflower genotypes including hybrids, varieties, R-lines, CMS-lines and inbreds were initially screened in the laboratory to select saline tolerant lines. Initially sodium chloride (NaCl) concentrations were standardized and later seven different concentrations (0, 50, 100, 150, 200, 250 and 300 mM NaCl) were considered for the screening. Physiological observation *viz.*, germination per cent, total seedling length (cm), per cent reduction in seedling growth over control and seedling vigour index were recorded. Later all the entries were classified as susceptible, moderately tolerant and tolerant lines. CMS-lines performed well even at higher osmotic concentrations. Many of the inbreds and R-lines were susceptible at 100 and 150mM NaCl concentrations. This screening technique can be followed for the initial screening of more number of sunflower genotypes in the laboratory before evaluating them in the field.

Key words : Osmotic potential, Sodium chloride concentration, Sunflower

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INTRODUCTION

Salinity in soil or water is one of the major stresses and, especially in arid and semi-arid regions, can severely limit crop production (Ashraf and Harris, 2004). High salt concentration in the soil solution is bound to create high osmotic pressure in the root zone and reduce availability of water and nutrients to plants. Such conditions are known to affect plant physiological activities which determine the crop yield (Hebbara *et al.*, 2003). The deleterious effects of salinity on plant growth are associated with low osmotic potential of soil solution (water stress), nutritional imbalance, specific ion effect (salt stress), or a combination of these factors. Nearly 20 per cent of the world's cultivated area and nearly half of the world's irrigated lands are affected by salinity. Processes such as seed germination, seedling growth and vigour, vegetative growth, flowering and fruit set are adversely affected by high salt concentration, ultimately causing diminished economic yield and also quality of produce (Zhu, 2001).

Sunflower (*Helianthus annuus* L.) is moderately tolerant

to salinity and yield is unaffected by salinities up to 4.8 dS⁻¹ m in the saturation soil extract and declines by approximately 5 per cent per unit increase in salinity thereafter (Francois, 1996).

As the evaluation of large number of entries to salinity under field conditions is difficult, an experiment was conducted in the laboratory using Petriplates for initial screening of sunflower entries for salinity with respect to germination per cent, root length, shoot length and total seedling vigour.

RESEARCH METHODOLOGY

The screening was conducted in the laboratory using Petriplates. For standardization, the seeds of two sunflower hybrids (KBSH-44 and KBSH-53, sunflower hybrids released from UAS, Bangalore) were exposed to different sodium chloride (NaCl) concentrations *viz.*, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400mM NaCl along with control (water). Five ml of respective saline solution was taken in each Petriplate. Counting of germinated seeds was done daily for 6 days in each treatment. The observations indicated that the seeds of KBSH-53 were germinated up to 250 mM NaCl and