

## Research article

# INFLUENCE OF EXOGENOUSLY APPLIED BEET EXTRACT ON SUNFLOWER (*Helianthus annuus* L.) UNDER SALINE CONDITIONS

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Salinity is major constraint for agricultural productive areas especially in arid and semi-arid regions of the world. A variety of protective mechanisms have evolved in plants to acclimatize these unfavorable environmental conditions for survival and growth. The present study was aimed to investigate the influence of exogenous foliar applied Beet extract on salt tolerance in sunflower (*Helianthus annuus* L.). For this purpose three NaCl treatments (0, 60, 120mM NaCl) and three treatments (0, 250g/1000ml and 500g/1000ml) of Beet Extract was applied. After forty days, root length, shoot length, fresh and dry weight of root and shoot were measured. Total soluble proteins, total free amino acids, total Chlorophyll, Chlorophyll a and b were also determined and then statistically analyzed. From the results it is clear that growth and growth component were significantly reduced due to salt stress. However, foliar application of Beet extract significantly ameliorates the toxic effects of salts on plant growth. Similarly, plant water status was significantly decreased due to external NaCl regime and considerably improved by foliar application of Beet extract. It might be possible that higher concentrations of Beet extract could also modulate osmotic adjustment capacity and salt tolerance in sunflower at higher level, needs to be investigated.

**Key words:** *Helianthus annuus*, Salinity, NaCl, Beet Extract, Total soluble proteins, Chlorophyll, exogenous.

## Introduction

Earth is a salty planet, with most of its water containing about 30g of sodium chloride per liter. This salt has affected and continues to affect, the land on which crops are, might be, grown. Although the amount of salt affected land (about 9 million ha) is imprecisely known, its extent is sufficient to pose a threat to agriculture (Flowers and Yeo, 1995; Munns, 2002). Since most plants and certainly most crop plants, will not grow in high concentration of salt: only halophytes grow in concentrations of sodium chloride higher than about 400mM. Consequently, salinity is threat to food supply.

Although there is currently food enough for the world population, more than 800 million people are chronically undernourished (Conway, 1997).

Salinity and sodality problems are common in arid and semiarid regions, where rainfall is insufficient to leach salts and excess sodium ions out of the rhizosphere. Nearly 10% of the total land surface is covered with different types of salt-affected soils. At present, there are nearly 954 million hectares of saline soils on the earth's surface. In Pakistan, about 6.30 million hectares of land are salt-affected and of which 1.89 hectares is saline, 1.85 million hectares is permeable saline-sodic, 1.02 million hectares is impermeable saline-sodic and 0.028 million hectares is sodic in nature. It is estimated that out of 1.89 million hectares saline patches, 0.45 million hectares present in Punjab, 0.94 million hectares

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