Response of Chickpea (*Cicer arietinum* L.) Plants to Salt Stress at Germination and Seedling Growth

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ABSTRACT

The present study was carried out to determine the effects of NaCl salinity on germination and seedling growth of chickpea. Salinity is one of the most dangerous environmental stresses limiting plant growth and productivity. For this purpose, the healthy and uniform sized seeds of cultivar PG-643 of Chickpea (Cicer arietinum L.) were grown in Petri-dishes, lined with filter paper and moistened with aqueous solutions of NaCl salt (25, 50, 75 and 100 mM) and distilled water was used as control. Germination percentage, seedling parameters such as length, dry weight of root and shoot were studied in 10 days old seedlings. The results indicated that germination percentage and seedling growth were significantly decreased with increasing salinity. It was concluded from the findings that all the parameters studied were highly affected at higher salinity levels.

Keywords: *NaCl Salinity, Germination, Seedling growth and Chickpea*

INTRODUCTION

Salinity is a widespread problem in arid and semi-arid regions which limits plant growth and productivity (Shannon, 1986). Salinity is a major abiotic stress limiting growth and productivity of plant in many areas of the world due to increasing use of poor quality of irrigation water and soil salinization. Plant adaptation or tolerance to salinity stress involves complex traits, metabolic pathway, and molecular or gene networks. A considerable area of land in the world is affected by salinity which is increasing day by day. More than 45 million hectares of irrigated land which account to 20% of total land has been damaged by salt worldwide and 1.5 million hectares are taken out of production each year due to high salinity in the soil (Munns and Tester, 2008). On the other hand, increased salinity of agriculture land is expected to have destructive global effects, resulting in up to 50% loss of cultivable lands by the middle of the twenty-first century (Mahajan and Tuteja, 2005).

Salt-affected soils are widespread over the world, especially in arid and semi-arid regions. Soil salinity and waterlogging are two of the main constraints present in irrigated agricultural lands. In India, the problem of salinity and alkalinity increases every year as a result of secondary salinization. In India, about 8.6 million hectares of land area is affected by soil salinity. Salt-affected soils occur in the states of Uttar Pradesh, Gujarat, West Bengal, Rajasthan, Punjab, Maharashtra, Haryana, Orissa, Delhi, Kerala and Tamil Nadu. There are two different cause of the development of soil salinity- (i) Primary salinity (ii) Secondary salinity. Primary salinity is occurred due to the long-term natural accumulation of salts in the soil or surface water. This is a natural process which is caused mainly by weathering of parent materials containing soluble salts through break down of rocks containing Cl^- of Na^+, Ca^{2+} and Mg^{2+} sometimes $SO4^{2-}$ and CO_3^{2-} . In addition, deposition of sea salt carried by wind and rain is also a reason, which varies with the types of soil. Secondary or induced by human salinity occurs due to

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