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Evaluation of sulphate and chloride dominant salt tolerance of groundnut genotypes based on physiological traits

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ABSTRACT

Six genotypes of groundnut were germinated at 28 ± 2^{0}C temperature in seed germinator and irrigated with sulphate and chloride dominant saline solution. Both type of salinity affected the normal growth of groundnut seedlings. Germination per cent, root and shoot length, fresh and dry weight of seedlings, vigour index, and relative water content (RWC) at 4 and 8 days after sowing (DAS) were recorded relatively higher in chloride dominated salinity compared to sulphate dominated salinity. It indicated that the sulphate dominant salinity was more detrimental to germination and seedling growth than chloride dominant salinity. Germination percentage was decreased significantly in all groundnut genotypes with increasing concentration of 0, 20, 40 and 80 m eq/L salts. Higher germination percentage was found in JL-24 in sulphate dominant salinity and GG-2 genotype in chloride dominant salinity. The higher root and shoot length were found in JL-24 and GG-2 genotypes while fresh and dry weight of seedlings were recorded higher in JL-24, GG-2 and GAUG-10 genotypes in response to salt stress. Jl-24 genotype exhibited superior in vigour index at 4 and 8 DAS. Among the genotypes tested, less reduction of RWC in GAUG-10 indicated greater tolerance capacity to both the salt stress. Thus, JL-24 was found relatively more salt tolerant genotype followed by GG-2 and GAUG-10 while GG-7, GG-13 and GG-20 were evaluated as salt susceptible genotypes against sulphate and chloride dominant salinity.

Key words : Groundnut, Salinity, Germination, Vigour index, Relative water content, Salt tolerance

INTRODUCTION

Among oilseed crops grown in India, groundnut occupies a predominant position. It has now not remained only as an important edible oilseed, but also gained prominence as an important cash crop and foreign exchange earner for India. Therefore, groundnut is rightly eulogized as 'King of oilseeds' in India as it contributes 40 per cent of the total area and 30 per cent of total production of oilseed crops. India ranks first in area (5 million hectares) and second in production (4.625 million tones) in the world, though the productivity level is less than half of the major groundnut growing countries and around one-third of the rest of world levels (Singhal, 2003).

The multiple uses of the groundnut make it an excellent cash crop for domestic markets as well as foreign trade. The total area under groundnut cultivation in India is 8.0 million hectares, which accounts for the total production of 7.5 metric tones with the productivity of 937.5 kg ha^{-1}. (FAO, 2004). Among the major groundnut growing states, Gujarat is the most important one accounting for 32 per cent of the total area. The total area under groundnut cultivation in Gujarat is 2 million hectares accounting for 4.4 metric tones production and the productivity is 2235 kg ha^{-1} (Anonymous, 2004).

The productivity of groundnut in India is lower because this crop is grown mainly on marginal lands in rain fed areas, inland saline and coastal saline soils with low inputs. A salt affected soil in India varies from 8.56 M ha to 10.9 M ha. In Gujarat, the salt affected area is 1.34 M ha. which work out to 6.5 % of cultivated area (Goyal *et al.*, 2004). Saurashtra region of Gujarat, which is popularly known as groundnut bowl of India, is affected by soil and water salinity. Due to non availability of good quality water, farmers have no option but to use saline water for groundnut cultivation. The management of saline water and soil salinity under agro climatic conditions for increasing groundnut production is one of the important areas of the research (Girdhar *et al.*, 2004).

Salinity is the accumulation of dissolved salts in the soil water to an extent that inhibits plant growth (Gorham, 1992). Salinity is a major constraint to food production because it limits crop yield and restricts use of land previously uncultivated. Salinity can affect growth, dry matter accumulation and yield. It is well known that dry mass of plant is reduced in proportion to the increase in salinity. The reduction in growth of salinized plants may be related to salt induced disturbance of the plant water balance, and growth reduction under salinity stress include ionic imbalances, changes in nutrient and phytohormonal status, physiological processes, biochemical reactions, or a combination of such factors (Kumar, 2000).

Among several strategies advised to overcome the problem of salinity stress, the selection of crop species or cultivars with salt tolerance traits has been considered an economical and efficient strategy. Hence, present study aimed to screen the salt tolerance genotypes of groundnut based on physiological traits which give better

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