Identification of Salinity Tolerant Groundnut Germplasm Lines

A.L. Singh, Hariprasanna K. and M.S. Basu
National Research Centre for Groundnut, P.B. 5, Junagadh -362 001, Gujarat, India

Groundnut is an important oilseeds crop of India, however the area under this crop is fluctuating in between 6.0-8.0 million hectare (m ha) mainly due to climatic variations and fluctuation in the productivity caused by various biotic and abiotic stresses. Salinity development due to non-scientific use of poor quality ground water is one of the major abiotic factors causing reduction in the area and productivity. About 2.0 m ha coastal and saline areas distributed in Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra states, playing important role in the production of groundnut, are affected by salinity. This calls for the attention by groundnut researchers to develop various management practices to salinity stress. Screening and development of salinity tolerant groundnut genotypes that can grow and tolerate the salinity is the most important option as genetic variability exists and there are a number of germplasm lines available in India. Once the genotypes are identified we can go for developing high yielding salinity tolerant groundnut varieties. Thus an effort was made to screen, the groundnut genotypes under salinity stress till maturity.

Two hundred and ten groundnut germplasm accessions were screened in the field for their tolerance of salinity stress during kharif (June-October) season. The soil salinity level of the experimental field was 3.0 dS/m electrical conductivity (EC) at the time of planting which decreased to 2.5 dS/m EC at maturity. The experiment was conducted in a randomized block design (RBD) with each genotypes sown in single row plots of 3 m in length at 45 x 10 cm spacing. The Data on field emergence at 15 DAS and plant stand at 46 DAS and at maturity and plant mortality, number of pods, pod and kernel yield, shelling out turn, 100-seed mass and harvest index at maturity were recorded.

The genotypes were ranked based upon the mortality and yield and top 10 genotypes showing lesser mortality and better yield were grouped as tolerant, however the genotypes showing higher mortality and lesser plant stand were grouped as sensitive.

The salinity reduced and delayed (by 3-7 days) germination, caused plant mortality, and reduced plant growth and yield. However, enough genotypic variations, in the percent germination, plant mortality and number of pods, pod and kernel yields were observed. The salinity reduced germination as a result the plant stand at 15 days after sowing (DAS), ranged from 13-85 % in various genotypes. At 46 DAS, the plant stand ranged between 9 and 93% indicating plant mortality as well slightly higher plant stand for some of the genotypes because of late germination. The plant mortality continued with the advancement of crop growth stages and only few genotypes were able to withstand the salinity till maturity with good plant stand and pod yield. The final plant stand at maturity was between 9 and 78 % with 16 genotypes showing 70 % or above population[1].

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Large variations in pod and seed yields, number of pods, shelling percent, 100-seed mass and harvest index was observed with groundnut genotypes. The highest seed yield was 203 g/m^2 in one genotype while nearly 80 genotypes had no seed yield and rest were in between. Similar pattern was observed in other parameters also. Of the 210 groundnut genotypes, 31 genotypes showing more than 100 g/m^2 seed yield with good plant stand were short-listed. Of these ten groundnut genotypes NRCG 10874, NRCG 420, NRCG 13831, NRCG 9052, NRCG 12750, NRCG 9189, NRCG 894, NRCG 13787, NRCG 13791, NRCG 9038 with more than 150 g/m^2 seed yield were categorized as salinity tolerant genotypes.

The tolerance is a relative term which depends upon the intensity of salinity and reaction of groundnut genotypes. As there was plant mortality as well as pod bearing in groundnut genotypes, the seed yield in an unit area (g/m^2) was chosen as the best criterion for selecting the salinity tolerant cultivars in this study. Here, after comparing 210 genotypes for their plant mortality and yield, ten genotypes were identified as salinity tolerant genotypes. Generally the groundnut is sensitive to salinity and does not sustain above 4 dS/m as a result information on its tolerance to salinity levels is meager, however, increasing salinity levels in general decrease germination and seedling growth and dry matter production.

Thus, from this study, it is evident that there are few germplasm accessions that can endure the salinity stress and also yield satisfactorily. These salinity tolerant germplasm accessions identified here, as such can be grown in the saline area and also can find their way in future breeding program. Further testing of these genotypes at different regimes of salinity may be useful to grow groundnut at higher level of salinity.