

Physiological screening for drought tolerance in pearl millet hybrids under polyethylene glycol (PEG) induced water stress

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ABSTRACT

Pearl millet [*Pennisetum glaucum* (L.) R Br. emend. Stuntz] is World's sixth and India's fourth important cereal crop. Pearl millet is grown predominantly in India and Africa. It is generally cultivated in area of arid and semi arid tropics receiving rainfall from 150-700mm. However, among the various abiotic stresses; drought is one of them, which limits its production by preventing from expressing its full genetic potential. Because of its potential for high dry matter production at water deficit and high temperature, it has made a mark in arid and semiarid areas. It is a drought resistant cereal having maximum potentiality of grain production in adverse conditions. In India, water deficit limits the crop production in about 67 % of the net sown area. Hence, the present investigation was undertaken at Department of Agricultural Botany and Biotechnology, B.A. College of Agriculture, Anand Agricultural University, Anand, India to identify the better parental lines and hybrids for drought resistance by inducing differential PEG mediated osmotic stress under *in vitro* condition. Physiological studies suggested that, among female parents, JMSA 101 followed by ICMA 94555 and among the male parents, IPC 1658 followed by J 2340 were found most superior for higher germination percentage, longer roots with better shoot height under PEG induced osmotic stress. The ability of crosses *viz.*, ICMA 94555 x IPC 1657, ICMA 94555 x IPC 1658, ICMA 95444 x J 2340 and ICMA 95444 x J 2340 to produce higher grain yield per plant under terminal water stress condition along with longer roots, increased shoot height and greater germination percentage under PEG induced water stress which helped to overcome the simulated drought stress more successfully as compared to other crosses tested. *In vitro* screening showed similar trend for the crosses as it exhibited during field evaluation for the grain yield per plant (kg/plant). Thus, PEG test can also provide a measure of drought sensitivity and gives drought tolerance indices in pearl millet, which could be used for drought resistance screening under *in vitro* conditions.

Key words : Physiological screening, Drought tolerance, PEG induced osmotic stress, Pearl millet and grain yield per plant