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Agronomy

Evaluation of maize (*Zea mays* L.) Inbred Lines Primed with Salicylic Acid under Low Temperature Stress

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Abstract

An experiment was conducted in controlled lab condition with 20 maize (*Zea mays*L.) inbred lines to find out tolerant and sensitive genotypes under low temperature stress (10°C). Seeds were primed with salicylic acid (SA) @ 20ppm, 40ppm and 50ppm along with hydro (water) priming for overnight and sown in plastic trays (size 18 12 cm) filled with well mixed fertilized soil. Dry seeds were considered as control. Low temperature exposure was given in Plant Growth Chamber upto10 days. Morpho-physiological observations were taken and found that hydro primed and salicylic acid treatments (20ppm, 40ppm and 50ppm) reduced time taken to 50% emergence (in days), mean emergence time (in days) and emergence index (%) and increased shoot length(cm), root length(cm) and relative water content (%) in all maize genotypes as compared to dry treatment (non-primed seeds). However, salicylic acid @ 20ppm, 40ppm and 50ppm treatments significantly increased the response of above parameters in genotypes HUZM-185 at parHKI-164-4 (1-3)2 as compared to dry and hydro primed treatments, while these values were found minimum in genotypes HUZM-80-1at par HUZM-36. Interestingly, among all SA treatments 20ppm performed best on aforesaid parameters in genotypes HUZM-185 and HKI-164-4 (1-3)2 while least in genotypes HUZM-80-1 and HUZM-36 as compared to dry, hydro, 40ppm and 50ppm of SA treatments.

Highlights

- Among all 20 genotypes HUZM-185 found tolerant and HUZM-80-1 sensitive after screening under low temperature stress (10°C).
- Salicylic acid @20ppm was found better on growth parameters than the remaining treatments.

Keywords: low temperature stress, maize, salicylic acid, seed priming

Maize (*Zea mays* L.) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. It is cultivated on nearly 150 mha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 36% (782 MT) in the global grain production.

Maize contributes maximum among the food cereal crops i.e. 40% annually (>800 million tonnes) in the global food production. In India, maize is the 3rd most important food crops after rice and wheat. *Rabi* maize is grown on an area of 1.49 Mha with a production of 6.40 MT and yield of 4,288 kg/ha (ISOPOM, 2013-2014). In Uttar Pradesh, Rabi maize is grown on an area of 0.07 Lac ha with a production of 0.23 Lac MT and Yield of 31.31Qtls/ha (AGRICOOP 2013). Maize is a chilling sensitive crop with a little capacity for acclimation to low temperatures, which is, nevertheless, often cultivated in areas subject to sub-optimum or variable temperatures. Thorough understanding of its response to low temperature is essential for the production of new cold-tolerant genotypes (Sowinski *et al.* 2005). Unfortunately, physiological and particularly genetical mechanisms responsible for the greater tolerance to chilling displayed by some maize genotypes are still poorly understood.

Salicylic acid (SA) is a phytohormone of phenolic nature.