RESEARCH PAPER

Physiological and biochemical changes during moisture stress in banana

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Present investigation was carried out to study the physiological and biochemical changes during moisture stress by identifying two contrasting genotypes from earliar studies *i.e. M. acuminata*. ssp *burmaniceoides* commonly recognised as 'Calcutta-4' belonging to AA genomic group and 'Bee hee kela' belonging to BB genomic group were used. The per cent reduction in photosynthetic rate (P_N) between control and stressed plants was 45.28 (%) for 'Calcutta-4' and 36.01(%) for 'Bee hee kela', Transpiration rate (E) was 30.24 (%) for 'Calcutta-4' and 22.36 (%) for 'Bee hee kela' and Stomatal conductance (gs) was 60.30 (%) for Calcutta-4 and 56.10 (%) for 'Bee hee kela', indicating BB genotypes are tolerant to water deficit conditions. Leaf water potential (Ø) was higher in 'Bee hee kela' (BB) both in watered (-0.913 MPa) and under stress (-1.518 MPa) situations when compared with 'Calcutta-4' (AA) control (-1.35 Mpa) and stressed (-1.824 MPa) plants. Malondialdehyde content was estimated to be high in 'Calcutta-4' than that of 'Bee hee kela' indicating higher degree of membrane damage in Calcutta-4. The two antioxidant enzymes namely Super oxide dismutase (SOD) and Catalase activities were found to be higher in Bee hee kela stressed samples than 'Calcutta-4' indicating better oxidative damage withstanding capacity. 'Bee hee kela' (BB) showed higher Ø, gs, and antioxidant enzyme (SOD and Catalase) activities. 'Bee hee kela' genotype is more drought tolerant than 'Calcutta-4'. Identified drought tolerant genotype can be further used as a donor for drought tolerance.

Key words **:** Banana, Drought, Photosynthesis, Melondialdehyde, Antioxidants

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INTRODUCTION

Bananas and plantains are important sources of carbohydrate for the millions of people worldwide. Globally banana (*Musa* sp.) is fourth most important commodity after rice, wheat and corn and is produced in tropical and sub tropical regions of developing economies, grown across 130 countries in an area of 8.25 mha with a production of 97.38 million tonnes (NHB Database, 2006). India leads in global banana production. The other important banana growing countries are Brazil, Philippines Indonesia, China, Ecudor, Cameroon, Mexico, Columbia and Coasta Rica. The important banana growing states of India are Maharashtra, Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Tamil Nadu, West Bengal and Orissa.

Drought stress induces a range of physiological and biochemical responses in plants. These responses include stomatal closure, repression of cell growth and photosynthesis and activation of respiration. An assortment of genes with diverse functions are induced or repressed by these stresses (Bartels and Sunkar, 2005).

The increasing demand for water for domestic and industrial needs has led to limited availability of good quality water for agriculture. Growing crops under such water limiting conditions is a great challenge for the scientists. Hence, understanding the response of the crops to moisture limiting conditions and using this knowledge for growing crops successfully is very much essential. Banana crop bearing a mesophyte is very sensitive to water stress conditions, most of its cultivation is under irrigation and understanding the changes in banana genotypes response to water deficit conditions is very important. Keeping above points in view, the present investigation was carried out with the objective to study the physiological and biochemical changes due to moisture stress in banana.