

Abstract

Drought is the most perilous abiotic stress that affects finger millet growth and productivity worldwide. For the successful production of finger millet, selection of drought tolerant varieties is necessary and critical stages under drought stress, germination and early seedling growth, ought to be fully understood. This study investigated the physiological and biochemical responses of six finger millet varieties (GBK043137, GBK043128, GBK043124, GBK043122, GBK043094 and GBK043050) under mannitol-induced drought stress. Seeds were germinated in sterile soil and irrigated with various concentrations of mannitol (200, 400 and 600 mM) for 2 weeks. In a comparative analysis relative water content (RWC), chlorophyll, proline and malondialdehyde (MDA) contents were measured to obtain the physiological and biochemical characteristics of drought stress. The results showed that increased levels of drought stress seriously decreased germination and early seedling growth of finger millet varieties. However, root growth was increased. In addition, exposition to drought stress triggered a significant decrease in relative water content and chlorophyll content reduction, and the biochemical parameters assay showed less reduction in RWC. Furthermore, oxidative damage indicating parameters, such as proline concentration and MDA content, increased. Varieties GBK043137 and GBK043094 were less affected by drought than the other varieties as shown by significant changes in their physiological parameters. Our findings reveal the differences between the physiological and biochemical responses of finger millet to drought and are vital for breeding and selecting drought tolerant varieties of finger millet. Further, genomic and molecular investigations need to be undertaken to gain a deeper insight into the detailed mechanisms of drought tolerance in finger millet.