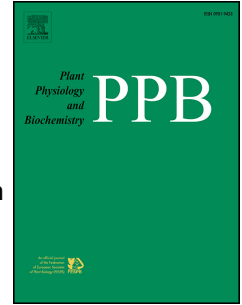


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Desi chickpea genotypes tolerate drought stress better than *kabuli* types by modulating germination metabolism, trehalose accumulation, and carbon assimilation

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1 ***Desi* chickpea genotypes tolerate drought stress better than *kabuli* types by**
 2 **modulating germination metabolism, trehalose accumulation, and carbon**
 3 **assimilation**

4
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 19 **ABSTRACT**

20 Chickpea is mostly grown in rainfed environments and, consequently, its growth is affected
 21 by drought stress. This study comprised two independent experiments to investigate the
 22 physiological basis of drought tolerance in *desi* and *kabuli* chickpea genotypes. In
 23 Experiment 1, six genotypes each of *desi* and *kabuli* types were planted in soil-filled pots
 24 under natural conditions. Ten days after planting, soil moisture was maintained at 75% water
 25 holding capacity (well-watered) or 50% water holding capacity (drought stress). Drought
 26 stress significantly reduced seedling dry weight, specific leaf area (SLA), and transpiration
 27 efficiency (TE) in both chickpea types, relative to the well-watered controls, but their
 28 responses varied, with relatively fewer reductions in *desi* genotypes, Bakhar-2011 and Bitall-
 29 2016, and *kabuli* genotypes, K-70005 and Noor-2013. These four genotypes were used in
 30 experiment 2, which was similar to the first but conducted in a climate chamber and the
 31 drought was imposed at planting. Drought stress reduced stand establishment, growth,
 32 photosynthesis, water relations, α -amylase activity, sugar metabolism, proline, phenolic
 33 accumulation, nitrogen and potassium to varying degrees in the four tested genotypes. The
 34 reductions were greater in *kabuli* genotypes than *desi* genotypes. Under drought stress, *desi*
 35 genotypes germinated better, and had higher trehalose, total and reducing sugars, sucrose, α -
 36 amylase activity, photosynthesis, growth, and mineral concentrations than *kabuli* genotypes.
 37 The *desi* genotype Bakhar-2011 performed better under drought than the *desi* genotype
 38 Bitall-2016 due to better germination metabolism and accumulation of free proline, total

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