Yield Potential Screening of Desi Chickpea Genotypes in Water Stress Conditions

Alireza Taleei\textsuperscript{a} and Jalal Shaabani\textsuperscript{b}

\textsuperscript{a} Professor in the Department of Agronomy & Plant breeding, Faculty of Agricultural Sciences and Engineering, College of Agriculture and Natural Resources, University of Tehran, Karaj, P.O. Box 31587-71787, Iran

\textsuperscript{b} Post graduate student in the Department of Agronomy & Plant breeding, Faculty of Agricultural Sciences and Engineering, College of Agriculture and Natural Resources, University of Tehran, Karaj, P. O. Box: 31587-71787, Iran.

E-mail: ataleei@ut.ac.ir

E-mail: jshaabani@ut.ac.ir

Abstract

Food legumes are valuable sources of vegetable protein foods, which productivity limited by environmental stresses as drought. To screen some of Iranian drought tolerant Desi chickpea genotypes, twenty-eight lines were assessed with two cultivars namely Pyrooz and Kaka as check varieties and surveying of the drought tolerance indices, too. Cluster analysis on traits-obtained data placed the genotypes 321 and 322 in a same group; these genotypes, moreover, were located with the genotype 10 at a distinct group based on tolerance indices. Total dry matter and grain yield were two characters that have most contribution of first factor; however, second one was justified predominantly by number of seed in the factor analysis. The greatest relationship with yield has shown for total dry matter of this crop. Genotypes with high values for grain yield in stress condition (Ys), stress tolerance index (STI), geometric mean productivity (GMP), and harmonic mean (HARM) were highly drought tolerant ones. In this work genotypes 321, 322, and 10 screened as tolerant ones and those of 407, 261, and 247 were susceptible, respectively. The results showed that the intended genotypes had short time of flowering and podding stages, to apply stress at 50% flowering time for overall genotypes.

Keywords: Cicer arietinum, drought stress, tolerance indices, factor analysis, cluster analysis

1. Introduction

Chickpea as the second most important grain legume crop in the world is cultivated mainly in arid and semi-arid regions. This crop is a main source of protein for many people in the developing countries, chickpea seed, further, has known as a full source of fibre, minerals (phosphorus, calcium, magnesium, iron, and zinc) and β-carotene that are essential elements in human diet (Singh \textit{et al}. 2016). Environmental stresses limit growth and productivity of plants, such as drought that has destructive effects on the crops life cycles. To tolerance drought harms and compensate of them, multiple strategies employed by plants. Drought stress causes reduction in leaf area, stem extension, and increase in the root system, also disturbs water relations, and reduces water-use efficiency in crops. On the other hand, plants responses at cellular, as biochemical and/or whole-organs levels to overcome drought stress damages could be very different; hence, making the mechanisms as a very complex phenomenon (Farooq \textit{et al}. 2009). Most yields of chickpea is ready in