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The evaluation of water deficit effect on grain yield and physiological characteristics of three canola (*Brassica napus* L.) cultivars

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Abstract

To investigate water deficit stress influence on stem elongation, flowering stage and some physiological characters of three canola (*Brassica napus*) cultivars including total dry matter, grain yield, total soluble sugars and starch, proline and osmotic potential this study was carried out in the green house of Shahid Chamran University of Ahvaz in 2008-2009 growing season. The experiment was factorial based on complete randomized design arrangement in three replications. The first factor comprised cultivars (including Hyola 308, Hyola 401 and RGS003) and the second factor was water deficit stress including water deficit in the early stem elongation to early-flowering stage (D_1), early-flowering stage to early sac appearance (D_2), early stem elongation to early sac appearance (D_3) and normal irrigation conditions (D_4). The results showed that the lowest and the highest reduction in shoot dry matter and grain yield was measured in Hyola 401 and Hyola308, respectively. The lowest shoot dry matter was in Hyola 308 (from the early stem elongation to early sac emergence stages) (22 grams per plant) and the highest shoot dry matter was in Hyola 401 (74 grams per plant) in normal conditions. In the stress conditions, shoot dry matter in all cultivars decreased. The amount of reduction during the flowering stage was more than early stem elongation stage showing more sensitivity of flowering stage to the stem elongation stage in water deficit stress. The interaction of water stress and variety showed significant differences in total soluble sugar, starch, proline, osmotic potential ($P\leq 0.01$), shoots dry matter and grain yield ($P\leq 0.05$). Furthermore, in the stress conditions participation in osmotic regulation process and reduction of negative effects of water deficit stress increased the amount of the total soluble sugars and proline of leaves. The lowest leaf osmotic potential (-2.23 Mpa) and the highest osmotic potential (-1.65 Mpa) were determined in Hyola 401, and Hyola 308 for D_3 and D_4 respectively. Decrease (become more negative) of osmotic potential because of more tolerance of Hyola 401 to water deficit stress was also assessed. According to the results of this study, Hyola 401, RGS003 and Hyola 308 were assessed for tolerance, semi tolerance and susceptibility to water deficit stress respectively.

Keywords: Proline, Osmotic potential, Water deficit stress, Grain yield, Total soluble sugars, Brassica napus