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The Effects of Plant Density and Irrigation Management on Forage Yield and Physiological Traits of Kochia, Quinoa and Forage Sorghum in Golestan Province

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Abstract

In order to study irrigation frequency and plant density of Kochia, Quinoa and forage sorghum, a field experiment was conducted during 2015 and 2016 at Salinity Station. The experiment was laid out in a randomized complete block design in form of split plot factorial experiment and replicated four times. At this research effects of irrigation frequency at four levels (irrigation after 5, 10, 15 and 20 days), and plant density at three levels (11.1, 16.7 and 33.3 plants per m2) on Koshia (Birjand and Sabzevar bulks), Quinoa (Santa Maria and Sajama Iranshahr) and verities of KFS3 and Speed feed sorghums were investigated (1-36). Sowing date was the time of soil temperature reaching to 12˚C and the harvesting date was the time of 5% flowering of each plot. Each variety was planted in four lines, the length of planting lines were 6 meters and inter row spacing was 60 cm. the seeds were planted in series, then distance of 5, 10 and 15 considered for plant densities of D1, D2 and D3 [1,2,4,6,8,13,15,17,19,21-24,3839]. For yield estimation, after removing borders, 6 m2 harvested. For measurements physiological treats, 10 bushes randomly sampled. Chlorophyll content was estimated using the method of Witham et al. (1986). Free proline concentration was determined by means of a rapid colorimetric method using an acid ninhydrin procedure developed by Bates et al. (1973). Data were analyzed using SAS software. Quantitative experiment results showed that; Sabzevar bulk at irrigation every 5 days' interval and 33.33 plants per m2 with yield of 33.99-ton ha-1 had the highest yield and chlorophyll content. With increasing low irrigation stress, amount of proline had increasing trend and Sabzevar bulk had the most amount of proline on its leaves [2,10,11,26-30,38] Figures 1-4.

Appendices

Figure 1: Comparing of Kochia and Forage Sorghum at vegetative stage.

Figure 2: Comparing of Forages at harvesting stage.

Figure 3: Harvesting of Kochia and observation of production biomass.

Figure 4: Comparing of Kochia and Quinoa at productive stage.

Keywords: Chlorophyll; Density; Forage Yield; Irrigation Frequency

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