Late water stress effect on forage barley production

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Abstract

The aim of this research was to study the effect of various combinations of fertilizers along with water deficit regimes on a whole forage barley crop. The field experiment was set up in two successive growing seasons of 2007 and 2008. Experimental design was a split plot arrangement based on a randomized complete block design with four replications. The treatments consisted of three irrigation regimes of: non-stressed (NS, normal irrigation until the end of the plant physiological maturity), moderate stress (MS, ceased irrigation from inflorescence to the beginning of grain filling stage and severe stress (SS, ceased irrigation from inflorescence to the end of the physiological maturity) and six fertilizer treatments consisting of 1. No fertilizer (control) (NF), 2. biofertilizer (BF), 3. 100% chemical fertilizer (CF), 4. Vermicompost (VC), 5. 50% chemical fertilizer (NPK) + 50% Vermicompost (CV), and 6. 50% chemical fertilizer (NPK) + biofertilizer (CB) assigned to the sub plots. Results showed that integrated fertilizing systems had the highest forage yield while under water deficit conditions (MS and SS), in both years. These results suggest that late forage production of barley could increase with late if barley fertilize with integrated fertilizers. This strategy could be more reliable than conventional to produce high quantity whole forage barley in arid environments with late water stress or water deficit irrigation system.

Key words: barley, integrated fertilizing system, water stress, forage yield

1. Introduction

Barley is also imported and used successfully in temperate and warmer semi-arid regions as a protein and energy source for milking herds (Anderson and Schroeder, 1999). Adequate healthy forage production for livestock in areas with water limitation is an essential factor to reach sustainability in agriculture. Finding the water and fertilizing management options to fit requirement in area with low water availability are necessary to use resources in a safer manner.

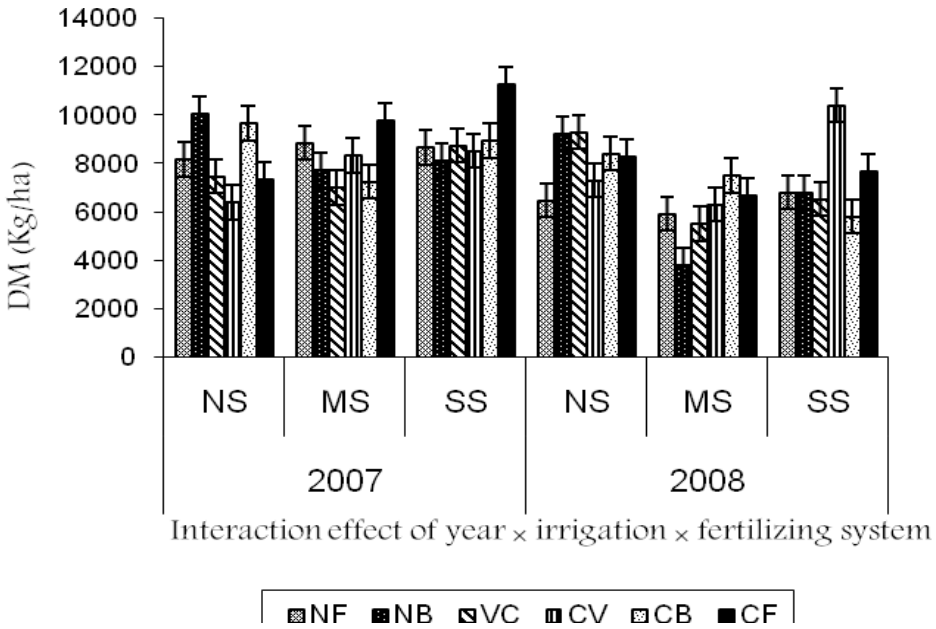
2. Materials and methods

Field studies were conducted at the Experimental Farm of the College of Agriculture, University of Tehran, Karaj, Iran (35^{o} 56' N and 50^{o} 58' E with an altitude of 1312 m) during the 2006-2007 and the 2007-2008 cropping seasons. The soil was a clay loam with a pH of 8.4 and 1.02 EC. Karaj has an average annual rainfall of 400 mm. The experimental design was a split plot arrangement based on a randomized complete block design with four replications The treatments consisted of three irrigation regimes (main plots) of: non-stressed (NS, normal irrigation until the end of the plant physiological maturity), moderate stress (MS, ceased irrigation from inflorescence to the beginning of grain filling stage and severe stress (SS, ceased irrigation from inflorescence to the end of the physiological maturity) and six fertilizer treatments consisting of 1. No fertilizer (control) (NF), 2. biofertilizer (BF), 3. 100% chemical fertilizer (CF), 4. Vermicompost (VC), 5. 50% chemical fertilizer (NPK) + 50% Vermicompost (CV), and 6. 50% chemical fertilizer + biofertilizer (CB), assigned to the sub plots. At soft dough stage (Zadoks 84) plants were harvested from the two central rows of

each plot. Feed samples were weighed, dried at 70 ℃ for 48 h and dry matter (DM) was measured.

3. Results

The DM was significantly ($P<0.01$) affected by all treatments and their interactions. Barley had high DM in CF under SS in 2007 but low DM was generally recorded in NB under MS in 2008. The DM under well irrigation (NS), treatments which received biological fertilizer produced high dry matter, however, under water stress theses treatments showed remarked decrease. In other fertilizing treatment dry matter under SS was more than MS or NS. 2007 had more favorable weather conditions (less temperature and more relative humidity) during generative growth stage, thus it had longer growth period after anthesis though it resulted more dry matter than 2008 especially after water stress treatments (Figure 1).



Results showed that integrated fertilizing systems (CV and CB) had the highest forage yield while under water deficit conditions (MS and SS), in both years. These results suggest that

late forage production of barley could increase with late if barley fertilize with integrated fertilizers. This strategy could be more reliable than conventional to produce high quantity whole forage barley in arid environments with late water stress or water deficit irrigation system.

Reference:

Anderson, V. and Schroeder, J.W. 1999. Feeding Barley to Dairy Cattle. EB-72.