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Shahid Chamran University of Ahvaz

EXTENDED ABSTRACT

The Interaction Effect of Salinity, Drought and Harvesting Dates on Yield, Quality and Efficiency of Forage Sorghum in Subsurface Drip Irrigation (Case Study: Sistan Plain)

H. Piri[1*], H. Ansari[2] and M. Parsa[3]

1*- Corresponding author, Assistant Professor, Department of Water Engineering, Zabol University, Zabol, Iran, *(H_piri2880@uoz.ac.ir)*

2- Professor, Department of Water Engineering, Ferdowsi University, Mashhad, Iran.

3- Associate Professor, Department of Water Engineering, Ferdowsi University, Mashhad, Iran.

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Introduction

Forage sorghum is one of the tolerant salinity plants that can provide a good source of forage under irrigated conditions with saline water. Considering the quality of the products, their value is estimated with regard to their quality. Therefore, similar to many crops, the quality of forage plants should be considered. The quality of forage can be a function of forage consumption and its digestibility(Paterson et al., 1994). Forage plants in livestock trapping as a result of livestock production are undeniable in the supply of human needs. Unfortunately, in Iran, less attention is paid to the production and management of forage compared to other crops. As a result, lack of attention to the quantitative and qualitative increase of forage has led to a shortage of meat and dairy products and a decrease in their quality. Therefore, paying attention to the cultivation of forage plants with a scientific method in a country that is faced with the excessive growth of population and the shortage of rich meadows is very important (Noroozi et al., 2015). Sorghum is one of the important forage crops that is widely cultivated as summer forage in most of the dry and semi-arid countries of the world. Forage sorghum is used as green, dry, silage, or even for direct grazing of livestock (Rezvani moghaddam and Nasir mahallati, 2004). In thecurrent research, the effect of drought stress on sorghum was investigated. The results showed that the yield components including the number of seeds per plant and weight of 100 seeds decreased compared to the control (Innes and Black, 2001). Therefore, in this study, the effect of different levels of salinity and irrigation water and harvest on the yield of forage sorghum was investigated in order to use the results for proper planning to increase agricultural production in specific conditions, i.e., salinity and water restriction.

Methodology

The present study was carried out in a factorial split plot design. Treatments included three irrigation water salinity factors (s1, s2 and s3 equal to 2, 5 and 8 dS / m, respectively) , four levels of irrigation water depth (I1, I2, I3 and I4) equivalent 50, 75, 100 and 120% respectively water requirement sorghum plant) and three forage harvests were carried out in three replications. The

dimensions of the plots were 4 * 3 (m / m) and the plot was spaced apart by one meter. The cultivation was carried out in a row with a row spacing of 75 cm and a plant spacing of 7.5 cm from each other.

Plant sampling

In this design, the harvest was carried out three times. Every time, fresh and dry forage yield, water consumption efficiency and quality characteristics such as the concentration of cell wall hemicellulose (NDF), free from cellulose (ADF) and total digestible nutrients (TDN) of the plant were measured. The measured data were analyzed using SAS software and the means were compared by Duncan's test.

Results and Discussion

Salinity and dehydration reduced forage yield. The highest fresh forage yield (74.46 $t.ha^{-1}$) and dry forage (26.66 $t.ha^{-1}$) were related to 120% water requirement and the salinity of two $ds.m^{-1}$ and the second and lowest (11.23 $t.ha^{-1}$ for fresh forage and 4. 5 $t.ha^{-1}$ for dry forage) is related to the treatment of 50% of plant water requirement and the salinity of 8 $ds.m^{-1}$ and the third harvest. The water consumption efficiency was significantly different between the treatments with 99% confidence. Comparison of the mean of the measured traits showed that as a result of increasing salinity from 2 $ds.m^{-1}$ to 5 and 8 $ds.m^{-1}$, the amount of fresh and dry forage efficiency decreased. Among different harves, the third one with 11.11 and 3.89 $kg.m^{-3}$ of water consumed, had the highest fresh and dry forage efficiency. Comparison of the mean effects of salinity, irrigation water and harvesting chin showed that by increasing the salinity of two $ds.m^{-1}$ to eight $ds.m^{-1}$, the amount of NDF increased by 11.66%. Also, by increasing the irrigation water depth, the amount of NDF decreased. Harvesting chin also had a significant effect on the concentration of NDF. As harvesting chin increased, NDF rose from the first chin to third the chin. With an increase in salinity, ADF concentration decreased by 15.89%. Reducing the depth of irrigation water also reduced the amount of ADF. By reducing the irrigation water depth from 120% of the plant's water requirement to 50% of the plant's water requirement, the amount of ADF decreased by 39.72%. Increased harvesting chin also reduced ADF concentrations. Increasing salinity from 2 $dS.m^{-1}$ to 8 $dS.m^{-1}$ increased the TDN by 15.88%. Increasing the depth of irrigation water reduced the amount of the TDN.

Conclusions

According to the results obtained from the research, it can be said thatsub surface drop irrigation improves the efficiency and function of forage sorghum in Sistan region. Also, there is no significant difference between treatments of 75 and 100% of water requirement and salinity of 2 and 5 $dS.m^{-1}$ in terms of yield and dry forage and water use efficiency. Therefore, the amount of water given to the plant can be reduced to 75% of the plant's water requirement and with proper management, it is possible to use low quality water resources for irrigation of sorghum without significantly reducing the yield.

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