



Effects of nitrogen fertilizer and plant growth regulator on stalk yield and bioethanol in sweet sorghum

Maryam Usofzadeh^{1*}, Mashalla Daneshvar¹, Abbas Almodares² and Hamid Reza Eisvand¹

1. Faculty of Agriculture, University of Lorestan, Khorram Abad, Iran

2. Department of Biology, Faculty of Science, University of Isfahan, Isfahan, Iran

Abstract

In this study, the effects of nitrogen fertilizer and plant growth regulator (ethephon) application on leaf chlorophyll, stem height and diameter, stalk yield, total sugar and bioethanol of sweet sorghum were determined. Four nitrogen treatments 0, 100, 200 and 300 Kg Urea ha⁻¹ and four ethephon concentrations 0, 800, 1000, and 1200 ppm were applied on sweet sorghum in a split plot on randomized complete block design with three replications. The results showed that interaction of nitrogen and ethephon on stalk yield was significant. The highest stalk yield (30.91 t ha⁻¹) was obtained with the application of N₄E₄ (300 kg Urea ha⁻¹ and 1200 p.p.m (ethephon) and the lowest (12.15 t ha⁻¹) with control and N₂E₁ (100 kg Urea ha⁻¹ and 0 ppm ethephon). Maximum amount of total sugar (12.06 %) was obtained at 300 Kg Urea ha⁻¹. The lowest bioethanol was 2423 L ha⁻¹ at 0 ppm ethephon and the highest was 4424 L ha⁻¹ at 1200 ppm ethephon. Based on these results, it is suggested to apply 300 Kg Urea/ha and ethephon at 1200 ppm to have the highest bioethanol in sweet sorghum.

Keywords: nitrogen; ethephon; sweet sorghum; biomass; bioethanol

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Introduction

Sorghum (*Sorghum bicolor* L. Moench) is well adapted to sub-tropical and temperate regions of the world and is used in different ways in many countries. Sweet sorghum is consumed as food and feed (Almodares et al., 2007) and used for sugar, ethanol and paper pulp production (Gnansounou et al., 2005). The

essence of sweet sorghum is from its stalk, which contains high sugar content (Almodares et al., 2008). In addition, sweet sorghum is a C4 crop with high photosynthetic efficiency. Crop management is important to attain higher stalk yield in sweet sorghum. Among the various inputs that improve the efficiency of a cultivar in realizing its potential, fertilizers (nitrogen in particular) play a crucial role. Nitrogen is generally a limiting nutrient in sorghum production. To achieve economically viable

*Corresponding author

E-mail address: m.usofzadeh@yahoo.com

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