INTERNATIONAL JOURNAL OF BIOASSAYS
ISSN: 2278-778X
CODEN: IJBNHY
ORIGINAL RESEARCH ARTICLE
OPEN ACCESS

REDUCING SUGAR CONTENT IN *ELEUSINE CORACANA* GAERTN UNDER STRESSED CONDITIONS

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Received for publication: June 07, 2015; **Revised:** June 10, 2015; **Accepted:** June 18, 2015

Abstract: Reducing sugars are sugars with potentially free aldehyde or ketone groups, able to reduce metal ions under alkaline conditions. At high salt concentration of 150mM pretreated plants, the reducing sugars decreased in both the cultivars but the decrease in HR 374 cultivar was by74 %. Dapoli-3 variety showed the increased amount of reducing sugars at 2 days water stress which was almost three folds more while in HR-374 it was nearly one and a half folds compare to control. Reducing sugar content in Dapoli-3 variety, under salt stress and drought conditions, increased while in HR- 374 the content decreased. Present study deals with reducing sugar content in *Eleusine coracana* showing its salt and drought tolerant ability.

Key words: *Eleusine coracana;* Reducing sugars; salt Stress; Drought; Pretreated seeds; mM

INTRODUCTION

Sugars with potentially free aldehyde or ketone groups are able to reduce metal ions under alkaline conditions. Such sugars are called as reducing sugars. Ragi (*Eleusine coracana* Gaertn.) is cultivated on variety of soils ranging from rich loams to poor shallow upland soils. The nutritive value of ragi is higher than that of rice and equal to that of wheat.

Due to lack of irrigation facilities, vast land remains under uncultivated condition. Increase in leaf carbohydrates helps in osmotic adjustment during water stress in cotton[1]. Salinity is a major constraint to agriculture crop production in many parts of the world. A soluble sugar seems to play some role in the osmotic adjustment of *Sesbania grandiflora*, a salt tolerant legume[2]. Muskmelon seed priming with PEG or KNO3 solution improve seeds germination at low temperature condition[3]. Watermelon seed priming with KNO3 solution, effectively improved germination and seedling growth of the seeds under salinity compared to non-primed seeds[4].

Taking into considerations, these aspects, the varieties viz. Dapoli-3 and HR-374 were grown in pot culture and artificial water and salt stress conditions were created and presowing salt treatment was given to study reducing sugar content under stress.

MATERIAL AND METHOD

Estimation of reducing sugars

The reducing sugars were estimated by the method of Folin and Wu (1927). Reducing sugars were quantified by calibrating with standard graph using standard glucose.

Pot culture

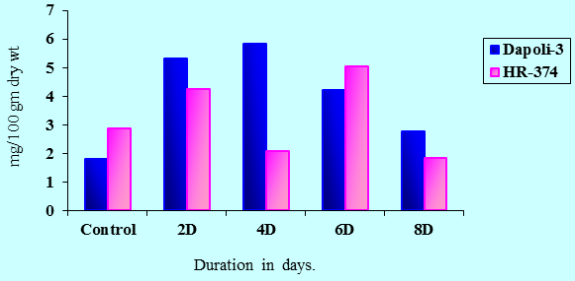
Crops of Dapoli-3 and HR-374 were raised in pots giving salt stress of 8mM, 30mM, 80mM, 150mM and water stress of 2days, 4days, 6days, 8days.By giving salt presowing seed treatment, both the cultivars were grown in corresponding increasing salt concentrations and carbohydrates were analyzed.

RESULTS AND DISCUSSIONS

Reducing Sugars at increasing drought conditions

Carbohydrates are the main assimilatory products in crop plants. Water stress reduces the photosynthetic efficiency in the crop plants. Reducing sugars were estimated from the leaves of plants growing under normal and water stress conditions. The amount of reducing sugars increased in leaves of plants, which were subjected to water stress for a short duration of two days. This increase was significant in Dapoli-3 variety; the increase was almost three folds while in HR-374 it was nearly one and a half fold. After 8 days of water stress, Dapoli-3 showed a decrease in reducing sugar level by 50 % and in HR-374, the level fell by 40 % **(figure 1).**

Fig.1 Effect of increasing Drought on Reducing sugar in *Eleusine coracana* Gaertn.



Ackerson (1981) found that increase in leaf carbohydrates helps in osmotic adjustment during water stress in cotton. The accumulation of reducing sugars in water stressed leaves of *Panicum maximum*

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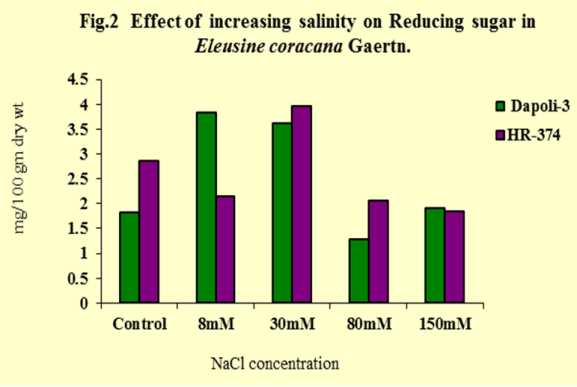
and considered that contribution of carbohydrate to the osmotic adjustment is relatively small to the accumulation of solutes[5].

Effect of Increasing Salt Stress on Reducing Sugars

The amount of reducing sugars present in the leaves of Dapoli-3 and HR-374 is depicted in **figure2.** When the plants were irrigated with low concentration of salts viz. 8 and 30mM there was a significant increase in the content of reducing sugars in the leaves of these plants indicating that they have capability to tolerate low concentration of salts. However, as the concentration of slats increased the levels of sugar decreased by 24 % in HR-374 but in Dapoli-3 the amount of reducing sugar were comparable to those of control plants of the same cultivar.

Work on sorghum seeds and observed that the stress causes a decrease in starch content and an increase in sugar content[6]. The amount of total soluble sugar/embryonic axes free weight increase rapidly answering to the increasing concentrations of NaCl[7]. Reduced sugars of stem & leaf in *Lycopersicon esculentum* cultivars decreased when plants exposed to salt stress[8]. There was higher accumulation of reducing sugars in root while decrease in the level of starch content at the higher salinity in *Dolichos biflorus*[10].

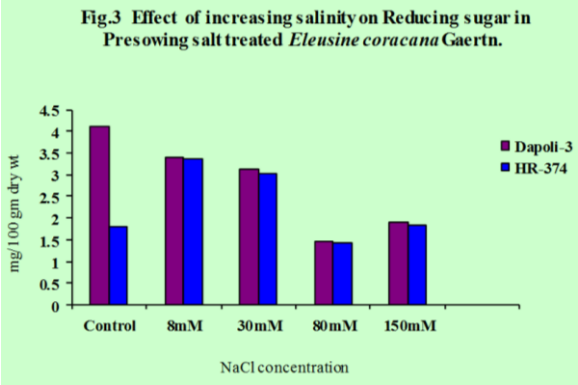


Effect of Presowing Salt Stress on Reducing Sugars

Results obtained are depicted in **figure 3**. At lower concentration of NaCl i.e. 8 mM, there was increase in the reducing sugar content of Dapoli-3 cultivar but HR- 374 showed 38 % decrease in the reducing sugar content at the same concentration of salt. At high salt concentration of 150mM, the reducing sugars decreased in both the cultivars but the decrease in HR 374 cultivar was by74 %.

Effect of salinity in carbohydrate metabolism in different crop plants[10, 11, 12]. Seed priming increased antioxidant enzyme activity, soluble carbohydrate and proline content and decrease seed membrane damage of muskmelon cultivars[13]**.** Exogenous application of NO as pre-sowing treatment to maize seeds resulted in enhanced salt tolerance ability of maize seedlings[14]. Wheat straw, pretreated with ozone and stated that the concentration of reducing sugars was increased by 3, 59 – 5, 22 mg g–1 dry compared with that of reducing sugars in not pretreated straw[15].

In the present investigation, decrease in the level of carbohydrate contents under higher salt stress condition is a common feature for both the cultivars, grown under higher salt stress condition. However, total carbohydrate content in Dapoli-3 variety was lower than HR-374 indicating slightly higher salt tolerance ability.



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CITE THIS ARTICLE AS:
Kadam Sonali Santosh, Reducing Sugar Content In *Eleusine Coracana* Gaertn Under Stressed Conditions, International Journal of Bioassays, 2015, 4 (07), 4155-4157.

Source of support: Nil
Conflict of interest: None Declared