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GROWTH AND FOLIAR CONTENTS OF Na^+ AND Cl^- IN GENOTYPES OF FORAGE SORGHUM IRRIGATED WITH SALINIZED WATERS

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1 ABSTRACT

Plant efficiency in developing specific mechanisms to survive under salt stress can vary significantly among genotypes, which implies different responses in growth and yield. The aim of this study was to evaluate the salt tolerance of forage sorghum genotypes by analysis of growth variables correlated with the levels of Na^+ and Cl^- accumulated in the leaves. The research was carried out in a greenhouse belonging to the Brazilian Agricultural Research Corporation (EMBRAPA) – Semiarid, in Petrolina, Pernambuco state, Brazil. The treatments were arranged in a randomized block design with factorial arrangement 10x6 with ten genotypes ('F305', 'BRS 655', 'BRS 610', 'Volumax', '1,015,045', '1,016,005', '1,016,009', '1,016,013', '1,016,015' and '1,016. 031'), salt solutions with six levels of electrical conductivity (0, 2.5, 5.0, 7.5, 10 and 12.5 dS m^{-1}) and three replications. The variables evaluated were dry mass and water content of the shoots and roots, plant height, stern diameter, leaf area and foliar concentration of Na^+ and Cl^-. It was found that the growth of forage sorghum genotypes is similarly affected due to the increase of Na^+ and Cl^- foliar contents. The growth of forage sorghum is reduced by 50% when the plants are submitted to the application of saline solution with electrical conductivity of 8 dS m^{-1}.

Keywords: leaf area, salt stress, dry matter, *Sorghum bicolor* (L.) Moench.

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CRESCIMENTO E TEORES FOLIARES DE Na^+ E Cl^- EM GENÓTIPOS DE SORGO FORRAGEIRO IRRIGADOS COM ÁGUAS SALINIZADAS

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2 RESUMO

A eficiência das plantas em desenvolver mecanismos específicos para sobreviver ao estresse salino pode variar significativamente entre genótipos, implicando em respostas diferenciadas no seu crescimento e rendimento. O objetivo do presente estudo foi avaliar o crescimento e teores foliares de Na^+ e Cl^- em dez genótipos de sorgo forrageiro submetidos a irrigações com águas salinizadas. O experimento foi conduzido em casa de vegetação localizada na sede da Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) – Semiárido, em Petrolina – PE. Utilizou-se o delineamento experimental em blocos casualizados dispostos em esquema fatorial 10x6, considerando dez genótipos ('F305', 'BRS 655', 'BRS 610', 'Volumax', '1.015.045', '1.016.005', '1.016.009', '1.016.013', '1.016.015' e '1.016.031'), soluções salinas com seis valores de condutividade elétrica (0; 2,5; 5,0; 7,5; 10 e 12,5 dS m^{-1}) e três repetições. As variáveis avaliadas foram massa seca e conteúdo de água da parte aérea e raízes, altura da planta, diâmetro do colmo, área foliar e teores foliares de Na^+ e Cl^-. Verificou-se que o crescimento dos genótipos de sorgo forrageiro foi afetado similarmente com o aumento da salinidade devido à elevação das concentrações de Na^+ e Cl^- nas folhas. O crescimento do sorgo forrageiro é reduzido em 50% quando as plantas são submetidas à aplicação de solução salina com condutividade elétrica de 8 dS m^{-1}.

Palavras-chave: área foliar, salinidade, massa seca, *Sorghum bicolor* (L.) Moench.

3 INTRODUCTION

The use of saline water has been considered a viable alternative for crops production, especially in areas presenting low water quality and insufficient rainfall (OLIVEIRA; GOMES-FILHO; ENÉAS-FILHO, 2010).

The salt interference on growth and yield crops is inevitable when subject to salinity conditions. According to Tavakkoli et al. (2012), the main problem is the osmosis mechanism attributable to the salts accumulation in the soil, which directly interferes over the absorption of water by plants, causes nutritional imbalances, due to reduced absorption of nutrients such as Ca^{2+}, K^+, and NO_3^-. The high uptake of Na^+ and Cl^- can also reach toxic levels.

The excess of Na and Cl cause disturbances in the protoplasm and jeopardizes enzymes and membranes functions (WU; SELISKAR; GALLAGHER, 2005). In response to those stress conditions, osmotic mechanisms are activated by plants in order to promote the maintenance of cellular functions (TÜRKAN; DEMIRAL, 2009). The ions compartmentation in vacuoles or exclusion by tissues and organs occur (BAVEI; SHIRAN; ARZANI, 2011), as well as synthesis of compatible solutes (MISRA; SAXENA, 2009) and antioxidants (COSTA et al., 2005). In the case of plants that grow efficiently one or more mechanisms show higher tolerance to salt stress.

Those processes reflect directly on plant growth, and may interfere with their height (VIEIRA et al. 2005), leaf area (ARAÚJO et al., 2010) and plant water content (FERNANDES et al., 2011). Changes in accumulation and partitioning of dry matter due to the influence on CO_2 assimilation; production and distribution of photoassimilates can be affected too (AQUINO; LACERDA; GOMES-FILHO, 2007).

Sorghum (*Sorghum bicolor* (L.) Moench.) is a crop that has been widespread in the world due its importance in human and animal nutrition, production of sugar and ethanol (MIRANDA et al., 2013) and animal feed. The forage sorghum has very energetic biomass, with high digestibility and productivity (BUSO et al., 2011). Those characteristics associated

with a greater adaptation to conditions of water and salt stress have made forage sorghum more attractive in regions where there is no high quality water for irrigation.

Therefore, the degree of salinity tolerance may manifest differently among genotypes, reflecting directly in their growth and productivity. Bavei, Shiran e Arzani (2011) found that forage sorghum genotypes, which are more tolerant to salinity might present mechanisms that restrict the transport of Na^+ and Cl^- to leaves. Lacerda et al. (2001) observed, on the other hand, higher accumulation of those ions in the leaves of a forage sorghum genotype that is more sensitive to salinity.

The aim of this study was to evaluate the salinity tolerance of ten genotypes of forage sorghum and their responses on the growth and the foliar contents of Na^+ and Cl^- when irrigated with saline solutions presenting different levels of electrical conductivity.

4 MATERIALS AND METHODS

The experiment was conducted in a greenhouse located at the Brazilian Agricultural Research Corporation, in Petrolina, Pernambuco state, Brazil. We used plastic pots with a capacity of 8 liters, perforated and connected to hoses collector in order to allow the conduction of water fraction leached.

The pots were filled with a layer of gravel with approximately 2 cm and the volume completed with soil. The soil was an Arenic Haplustult (USDA, 1999), medium texture, collected at the layer of 0 to 0.2 m.

The experimental design used was the randomized blocks in a factorial 10x6 with ten genotypes of forage sorghum and saline water with six values of electrical conductivity (EC_w), and three replicates. The genotypes were 'F305', 'BRS 655', 'BRS 610', 'Volumax', '1.015.045', '1.016.005', '1.016.009 ', '1.016.013', '1.016.015' and '1.016.031', belonging to the germplasm bank of EMBRAPA - Milho e Sorgo.

Sowing was performed by placing five seeds per pot, 2 cm of depth. The thinning was carried out two weeks after sowing, leaving two plants per pot and starting the irrigation with saline solutions presenting EC_w values as follows: 0, 2.5, 5.0, 7.5, 10 and 12.5 dS m^{-1}. The solutions were prepared from the salts NaCl, $CaCl_2.2H_2O$ and $MgSO_4.7H_2O$, so as to obtain the proportion between Na:Ca:Mg of 7:2:1 (AQUINO; LACERDA; GOMES-FILHO, 2007).

In order to keep adequate levels of soil fertility, 500 mL of nutrient solution were prepared by using 5.4, 4.4 and 4.5 g per pot of NaH_2PO_4, KH_2PO_4 e $(NH_4)_2SO_4$ and 28.0, 31.5, 1.6, 67.5, 10.6, 3.0 and 4.0 mg per pot H_3BO_3, $CuSO_4.5H_2O$, $(NH_4)_6Mo_7O_{24}.4H_2O$, $MnSO_4.H_2O$, $ZnSO_4.7H_2O$, $FeSO_4.7H_2O$ and Na_2EDTA, respectively (ALVAREZ, 1974). The recommended amount was split in three equal applications every twenty days, starting after thinning.

Irrigation was performed in order to maintain soil moisture near field capacity (6,8%) and prevent the accumulation of salts. For salinity control, the pots were irrigated every two days, maintaining a leaching fraction of approximately 15%.

Plant height (PH), stem diameter (Ø), length (L) and width (W) of the leaf +3 (third leaf fully expanded counted from the top) were performed sixty days after the beginning of the application of saline solutions and measurements. The leaf area (LA) was estimated according to the model proposed by Sans and Pellegrin (1998) where LA = 0.7811xLxW-14,964 (R^2 = .98).

The harvesting was done on the following day in a period of ten days. The harvesting date was determined when the grains became soft and a white milk-like liquid was obtained when kernels were squeezed.

After the harvesting, the plants were separated into shoot (S) and roots (R) and weighed to obtain the fresh mass. Afterwards, the material was placed in the greenhouse to dry at 60 °C for 72 hours in order to determine the dry mass. From the data of fresh and dry mass, we estimated water content (WC) of shoots and roots considering the relation WC=(fresh mass-dry mass)x100/(fresh mass).

The dried leaves were triturated using a mill. Sodium levels (Na^+) determined in a flame photometer after the material was subjected to digestion with perchloric nitric (1:3 v/v). The determination of the chloride levels (Cl^-) was performed after extraction with deionized water and titration with $AgNO_3$ in the presence of the $K_2Cr_2O_7$ indicator (SILVA, 2009).

Data was subjected to variance analysis using the Sisvar 5.0 program (FERREIRA, 2003). For situations in which there was a significant interaction between genotypes and salinity levels, the variables were splitted inside each factor. Otherwise, it was considered the independent effect of the factors for the studied variables.

To compare the salinity levels, regression models of first and second degree when significant at 1% or 5% probability were performed. The Tukey test at 5% probability level was adopted for cases of not significant regressions ($p > .05$). For comparison among genotypes the Scott Knott test at 5% probability was performed.

5 RESULTS AND DISCUSSION

Variance analysis results showed that plant height, stem diameter, leaf area and dry mass of shoots and roots showed an independent effect among genotypes and salinity levels (Table 1).

Table 1. Analysis of variance (ANOVA) between genotypes, electrical conductivity of salt solutions (EC_w) and interaction genotypes X EC_w for the different variables.

	Mean Square								
Variation factors	PH	Ǿ	DMS	DMR	SWC	RWC	LA	Na^+	Cl^-
Genotypes	1335**	13.5**	184**	363**	8.9^{ns}	90.6^{ns}	70,650**	82.4**	839**
EC_w	43,906**	44.4**	6,651**	6,035**	120**	44.5^{ns}	33,942**	1,038**	17,541**
Genotypes X EC_w	240^{ns}	1.9^{ns}	37.1^{ns}	139^{ns}	16.9^{ns}	68.7^{ns}	3,0^{ns}	33.3*	293*
Residue	165	2.9	44.9	132	18.4	86.8	2,818	22.8	187
C.V. (%)	13.7	16	23.6	58.8	6	12.4	32.3	64.4	33.7

PH = Plant height, Ǿ = stem diameter =; DMS and DMR = dry mass of shoots and roots, SWC and RWC = Water contents in shoots and roots, LA = leaf area, C.V.%= coefficient of variation. **= p< .01, *= p< .05 and ns = not significant.

We observed significant differences only among the EC_w values, whereas the roots were not affected by salinity or by genotypes. However, for the levels of Na^+ and Cl^- in the leaves, the interaction was significant among factors.

The differences presented between the growth variables of genotypes, regardless of salinity levels evaluated (Table 2) showed distinct morphological characteristics that may favor higher adaptation to salt stress.

Table 2. Plant height, stem diameter, dry mass of shoots and roots, leaf area and water content of shoots in forage sorghum genotypes.

genotypes	PH (cm)	Ø (mm)	DMS (g)	DMR (g)	LA (cm^2)	SWC (%)
F305	91.3 b	11.3 a	33.2 a	13.7 a	321.8 a	71.5 a
BRS 655	97.8 a	9.8 b	28.4 a	7.7 b	119.0 c	71.0 a
BRS 610	75.5 d	10.3 b	22.9 b	6.1 b	121.7 c	72.0 a
Volumax	96.7 a	10.3 b	29.8 a	10.2 b	172.0 b	70.8 a
1.015.045	84.4 c	11.7 a	28.8 a	11.2 b	140.3 c	72.4 a
1.016.005	92.1 b	11.6 a	30.8 a	9.0 b	187.6 b	72.2 a
1.016.009	98.2 a	11.1a	28.1 a	12.8 a	181.8 b	72.0 a
1.016.013	104.7 a	10.2 b	29.5 a	8.6 b	110.1 c	71.3 a
1.016.015	91.4 b	10.8 a	29.4 a	9.4 b	171.1 b	70.9 a
1.016.031	102.0 a	8.9 b	23.0 b	9.0 b	117.9 c	72.9 a

PH= plant height; Ø= stem diameter; DMS= dry mass of shoots; DMR= dry mass of roots; LA= leaf area; SWC= water contents shoots. Means followed by the same letters in a column do not differ significantly by the Scott Knott test at 5% probability.

The genotypes 'BRS 655 ', 'Volumax ', '1.016.009', '1.016.013 'and '1.016.031' were taller than the others, with no significant differences among them (Table 2), while in 'BRS 610' and '1.015.045' the plant height was lower than the other genotypes.

Albuquerque et al. (2009), working with 'F305' and 'BRS 610', found that 'F305' was taller than 'BRS 610' during two consecutive cycles, corroborating the results.

Cunha and Lima (2010) stated that plant height of forage sorghum showed a higher yield of green mass, which is is one of the indicators of growth and vegetative development. However, it should be taken other variables into consideration, such as diameter, leaf area, dry matter accumulation, which varies significantly among genotypes.

The largest stem diameter were presented by 'F305', '1.015.045 ', '1.016.005', '1.016.009 'and '1.016.015'. On the other hand, for most of the genotypes there was no significant differences attributable to the dry mass of shoots, except for 'BRS 610' and '1.016.031', which were lower than the others.

In relation to the dry mass of roots, 'F305' and '1.016.009' were higher, which could mean an important characteristic in adaptation to salt stress. According to Sadeghi and Shourijeh (2012), the mass of roots is directly related to its growth and distribution in the soil. Therefore, higher values may represent greater capacity to support the development of shoots in saline conditions, minimizing problems and limitations in the water and nutrients uptake due to a larger volume of soil explored.

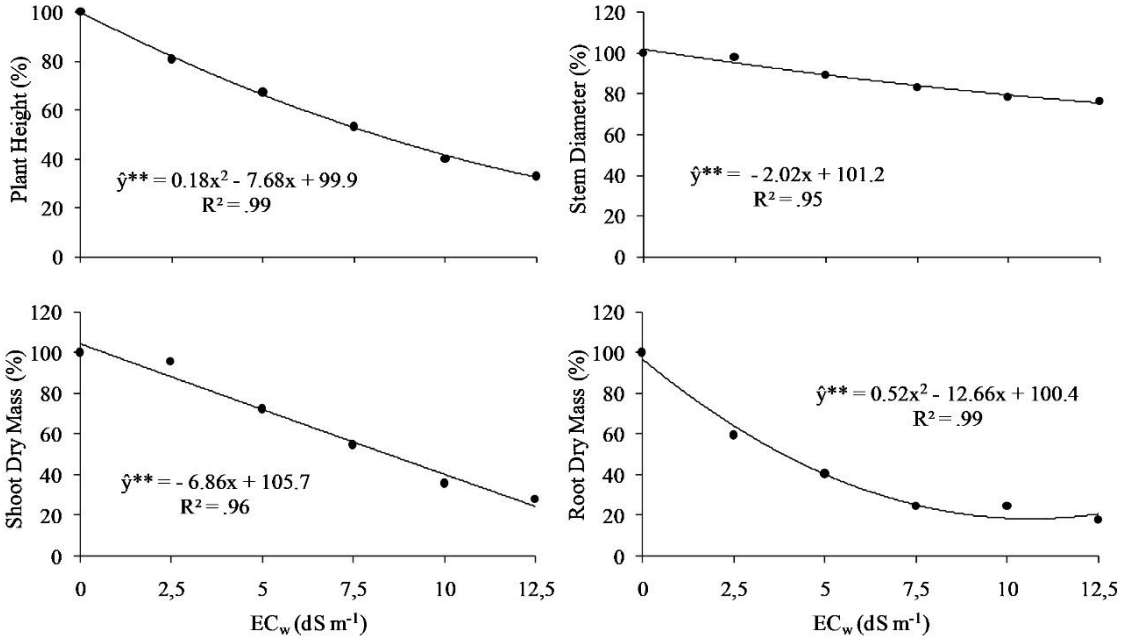
The genotype 'F305' presented higher leaf area when compared with the other genotypes (Table 2), which suggests a possible relationship with root growth and a wider area for photosynthesis, consequently, higher production and translocation of assimilates to the roots.

The water content of shoots showed no significant differences among genotypes (Table 2), it demonstrates that mechanisms used to regulate the water status of plants were activated

in a similar way for the genotypes. Those mechanisms may be related to stomatal closure, the ion accumulation in vacuoles and organic solutes in the protoplasm (ESTEVES; SUZUKI, 2008).

Salinity levels significantly influenced the reduction of growth variables. Reductions in plant height and dry weight of roots were represented by quadratic equations, whereas the decreases in stem diameter and dry mass shoots were linear (Figure 1).

Figure 1. Percentage reduction in height, stem diameter, dry mass of shoots and roots of sorghum plants irrigated with saline solutions with different electrical conductivity values (** = p <.01).



Plant height was directly affected by salinity, presenting a reduction of 50% for 8.0 dS m^{-1}. The effect of salinity on plant height is related to the reduction of soil water potential, which limits the water uptake by roots, intervening directly in extending process, cell division, and consequently on plant growth (TAIZ; ZEIGER, 2013). Silva et al. (2011) further suggested that this reduction is also due to the toxic effects of Na^+ and Cl^- on cellular metabolism.

The salinity influence on plant height of forage sorghum was reported in several works. Lacerda et al. (2001) observed reductions of 18 and 46% in the initial growth of the forage sorghum genotypes shoots of CSF20 and CSF18, under solutions of 100 mmol L^{-1} NaCl. Vieira et al. (2005), working with the genotypes CSF20 and CSF18, found reductions of 6 and 10%, respectively, in plants height when irrigated with saline solutions up to 5.8 dS m^{-1}. Miranda et al. (2008) found reductions between 9 and 72% in plant height of Sudan sorghum grown in saline-sodic soils with EC_{se} of 10 dS m^{-1} and differentiated application of $CaCl_2$.

Those results demonstrated that the influence of salinity on growing plants depends not only on the genotype, but also on the method of cultivation, the composition and the application way of the salt solution, chemical and physical properties of soils, as well as on the soil management techniques used.

Stem diameter, compared to the other variables, was considered less sensitive to salinity, with a reduction of only 25% for EC_w corresponding to 12.5 dS m^{-1}. This characteristic was

similar across crops subjected to salt stress, such as jatropha (VERAS et al., 2011) and cowpea (LIMA et al., 2007).

Similar to what happened with plant height, the dry mass of shoots showed a linear reduction with increasing salinity, reaching 50% for 8.0 dS m^{-1}. That linear decrease in dry mass of shoots demonstrates that salinity levels have not allowed defining the point where there is the salinity threshold (Ct) genotype, which represents the value in which EC_w can be achieved without reducing its potential income. According to Maggio et al. (2007), after the Ct point, the gradual decline in crop yield with salinity increasing takes place being common the presentation of a linear regression to explain such behavior.

Reduction in dry mass production of shoots were also observed by Aquino, Lacerda e Gomes-Filho (2007) in two genotypes of forage sorghum with salinity increasing. They showed decrease of 29 and 40%, respectively, in the genotypes CSF18 and CSF20 under irrigation with solutions up to 8 dS m^{-1}.

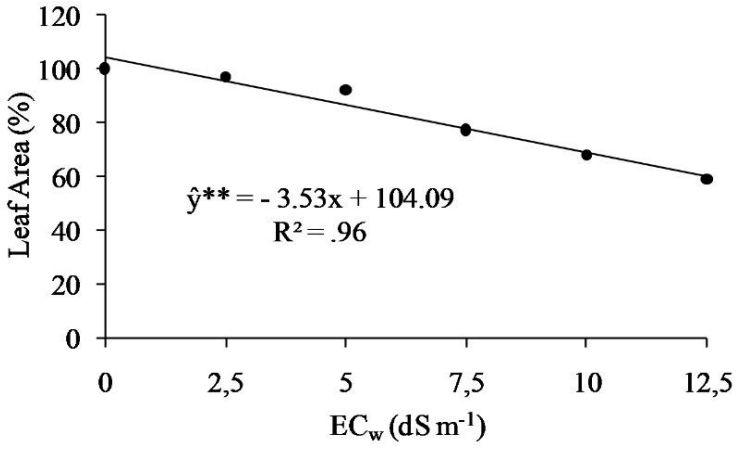
Santana et al. (2007) also observed decreases in dry mass for sugarcane when growning in soils with different textures and irrigated with saline solutions up to 8 dS m^{-1}. Crops such as Sudan sorghum showed a dry mass of shoots reduction above 60% when under solutions of 100 mmol L^{-1} NaCl (FEIJÃO et al., 2011).

According to Araújo et al. (2010) the reduction in dry mass production is mainly associated to the toxic effect of ions such as Na^+ and Cl^- on the carbon fixation and consequent photoassimilates production.

Considering the dry mass of roots, it was the variable most affected by salinity than shoot, presenting a reduction of 50% for EC_w = 5.0 dS m^{-1}. Different responses were observed by Lacerda et al. (2004), who found a reduction of 14% in the dry mass of the roots of forage sorghum genotype CSF18, while the CSF20 genotype decreased by only 8% under 75 mmol L^{-1} NaCl. For the same two genotypes of forage sorghum, Aquino, Lacerda e Gomes-Filho (2007) found that the dry mass of the roots were also affected when submitted to solutions up to 8 dS m^{-1}.

A linear reduction in leaf area were also observed with increasing salinity and corresponded to 40% for EC_w of 12.5 dS m^{-1} (Figure 2).

Figure 2. Leaf area in forage sorghum irrigated with saline solutions with different electrical conductivity values (** = p <.01).

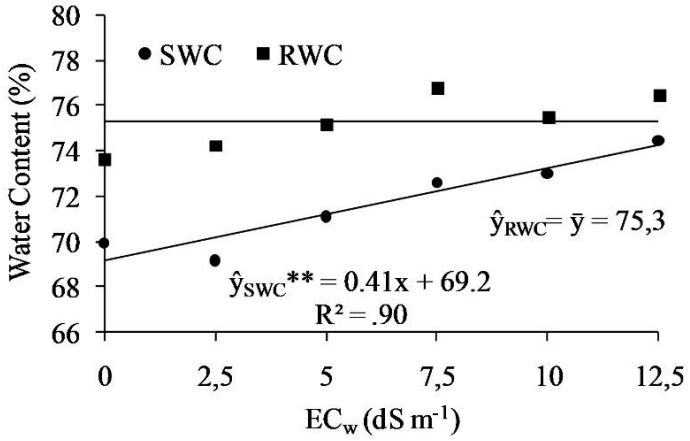


The leaf area decreases were probably associated to defense mechanisms of plants under salt stress aiming to reduce water loss through transpiration (TAIZ; ZEIGER, 2013). The

reduction in leaf area with consequent reduction in the cells volume probably contributed to the osmotic adjustment, assuming the amount of solute absorbed is concentrated in a smaller volume of cell juice (ARAÚJO et al., 2010). This reduction also represents changes in photoassimilate partitioning and limitation in area for the photosynthetic process (GOMES et al., 2011), which may be related to the reduction in dry matter production.

Regarding water contents of shoots (SWC) and roots (RWC), there was an increase in water contents of shoots with salinity increasing, while the water contents of roots was not affected due to salinity increasing (Figure 3).

Figure 3. Shoot (SWC) and root (RWC) water contents in forage sorghum plants irrigated with saline solutions with different electrical conductivity values (** = p <.01).



The increase in water contents of shoots with salinity increasing may be related to the effect of uptake and transport of ions such as Na^+ and Cl^- to the shoot, associated to the partial stomatal closing induction that help to maintain the water status of the plant (MUNNS; TESTER, 2008).

It was observed the gradual increase of the leaf sodium (Na^+) and chloride (Cl^-) contents in the leaves by increasing salinity able to reach toxic levels for the plants (Tables 3 and 4).

Table 3. Sodium (Na^+) foliar contents in forage sorghum genotypes under irrigation with saline water with different electrical conductivity.

genotypes	EC_w (dS m^{-1})					
	0	2.5	5.0	7.5	10	12.5
	Na^+ (g kg^{-1})					
F305	0.5 bA	0.6 bA	5.4 abA	10.6 abA	18.8 aB	14.8 aB
BRS 655	0.5 aA	1.2 aA	8.8 aA	4.3 aB	6.8 aB	9.2 aB
BRS 610	0.5 cA	0.6 cA	6.8 bcA	15.6 bA	13.1 bA	28.9 aA
Volumax	1.3 bA	1.5 bA	7.4 abA	11.5 abA	17.2 aA	17.4 aB
1.015.045	0.8 bA	0.5 bA	2.5 abA	4.5 abA	10.3 aA	12.3 aB
1.016.005	1.1 bA	1.1 bA	7.6 abA	14.8 aA	12.7 aA	10.8 abB
1.016.009	0.4 cA	0.7 cA	2.4 bA	10.9 aA	18.2 aA	16.1 aB
1.016.013	0.6 cA	1.5 cA	9.0 abA	13.0 aA	6.1 bB	15.7 aB
1.016.015	0.7 cA	2.2 bcA	8.5 abA	8.6 abB	13.0 abA	19.1 aB
1.016.031	0.4 cA	0.8 cA	3.3 bA	4.4 bB	1.6 bcB	11.1 aB

Columns with the same uppercase letter and lines with same lowercase letter do not differ by Tukey and Scott Knott tests at 5% probability, respectively.

In general, the concentration of Na^+ in the forage sorghum genotypes leaves increased with increasing salinity (Table 3). However, differences among genotypes were observed only from EC_w of 7.5 dS m^{-1}. In this case, 'BRS 610' presented higher concentrations of Na^+ to EC_w of 7.5 and 10 dS m^{-1} and showed the higher foliar contents of Na^+ to EC_w of 12.5 dS m^{-1}.

Foliar contents of Cl^- also showed tendency by increasing salinity levels with linear characteristic increase for the genotypes 'BRS 655', 'Volumax' and '1.015.045' (Table 4).

Notably, these values were much higher than the Na^+ contents found in the leaves of all genotypes. Such characteristic may be related to the fact that forage sorghum present possible mechanisms of ions retention, mainly Na^+, which minimizes the effects caused by its accumulation in the leaves (BAVEI; SHIRAN; ARZANI, 2011). Moreover, the Cl^- has a lower affinity of being held or retained by soil particles, which contributes to its greater plant uptake (DIAS; BLANCO, 2010).

Table 4. Chloride (Cl^-) foliar contents in forage sorghum genotypes under saline water irrigation with different electrical conductivity values.

genotypes	EC_w (dS m^{-1}) 0	2.5	5	7.5	10	12.5	Equation of regression	R^2
	Cl^- (g kg^{-1})							
F305	3.4 cA	16.5 cA	35.1 cA	52.6 bA	71.6 aA	70.5 aA	$\hat{y}= \bar{y} = 41.6$	--
BRS 655	2.5 A	18.4 A	38.8 A	32.2 A	49.9 B	44.4 B	$\hat{y}= 3.4x + 9.8$	.80*
BRS 610	2.7 cA	17.0 cA	28.5 bA	77.5 aA	75.7 aA	81.7 aA	$\hat{y}= \bar{y} = 47.2$	--
Volumax	4.8 A	22.2 A	54.6 A	71.7 A	78.5 A	79.9 A	$\hat{y}= 6.4x + 11.8$	.90*
1.015.045	4.0 A	14.9 A	49.9 A	45.2 A	61.4 A	68.0 A	$\hat{y}= 5.2x + 8.1$	.90*
1.016.005	5.7 cA	17.5 cA	38.8 bA	58.0 aA	66.0 aA	66.1 aA	$\hat{y}= \bar{y} =42.0$	--
1.016.009	1.9 dA	17.1 cA	29.1 cA	49.2 bA	67.3 aA	67.2 aA	$\hat{y}=\bar{y} = 38.6$	--
1.016.013	1.6 dA	22.0 cA	41.5 bA	50.3 bA	57.6 bB	72.7 aA	$\hat{y}= \bar{y} =40.9$	--
1.016.015	5.4 dA	19.7 cA	43.4 bA	50.4 bA	71.6 aA	77.9 aA	$\hat{y}= \bar{y} = 44.7$	--
1.016.031	2.4 cA	19.6 bA	29.7 bA	22.0 bB	28.5 bB	62.1 aA	$\hat{y}= \bar{y} = 27.4$	--

Columns with the same uppercase letter and lines with same lowercase letter do not differ significantly by Tukey Scott Knott test at 5% probability. *genotypes with significant regression model according to the t test for salinity levels evaluated.

The differences of Cl^- content in the leaves were also found from the values of EC_w of 7.5 dS m^{-1}, and the smaller contents were presented by '1.016.031' from EC_w of 7.5 dS m^{-1}, by '1.016.031' and '1.016.013' and BRS 655 from 10 dS m^{-1} and BRS 655 from 12.5 dS m^{-1}.

6 CONCLUSIONS

The growth of forage sorghum genotypes is similarly affected due to the increase of Na^+ and Cl^- foliar contents.

The growth of forage sorghum is reduced by 50% when the plants are submitted to the application of saline solution with electrical conductivity of 8 dS m^{-1}.

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