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PERFORMANCE OF SORGHUM AND PEARL MILLET FORAGE CROPS PRODUCTIVITY BY USING DIFFERENT AGRICULTURAL MANAGEMENTS UNDER SALINITY CONDITIONS

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ABSTRACT

The present study was carried out at South Sinai Research Station, Ras Sudr, South Sinai Governorate during 2008 and 2009 summer seasons. Two field experiments were carried out on two forage local varieties i.e. sorghum, hybrid 102 (*Sorghum bicolor L.* Moench) and pearl millet, Shandweel 1, (*Pennisetum glaucum* L.,R. Br.) irrigated with saline water (4000 ppm) under calcareous soil (53.6% $CaCO_3$) with pH values of 7.5-8.1, sandy to sandy loam as soil texture. The first one was conducted to study the response of two forage crops, sorghum and pearl millet to soil mulching with defoliated leaves of *Casuarina* sp. or without mulching aiming to reducing evaporation and increasing soil moisture content. The second one was carried out to study the effect of N rates as soil application i.e. 100, 75 and 50% of N dose recommended, 80 kg/ha, as a basal dose and after each cut as well as foliar application with 0.5, 1.0 and 1.5% urea before 2-3 weeks from any cutting time. The aim of this trial was to evaluate utilization of the proper soil N dose with supplementary by foliar application of urea to avoid the increase of soil salinity.

The main obtained results of the first experiment showed that soil mulching with casuarina defoliated leaves significantly increased soil moisture content as well as plant height, number of tillers/m^2, fresh and dry forage yields of sorghum and pearl millet forage crops as compared with without soil mulching, whereas, these increments were decreased gradually from the 1st cut to the 3rd cut. However, pearl millet forage crop had a significant increase in the above mentioned characters as compared with sorghum crop.

Results of the second experiment indicated that forage yield of the 1st cut was reduced with decreasing soil N application from 100% to 50% of N recommended dose. Forage yield of pearl millet crop produced more than 2 folds of sorghum crop under salinity conditions, however, forage yield of sorghum and pearl millet crops were reduced about 43.2% and 29.7%, respectively with decreasing N doses from 100 to 50% of the N recommended dose. These results indicated that pearl millet crop was more adapted to salinity conditions of South Sinai conditions. These findings may be due to pearl millet forage crop showed the fact that higher value of slope for salinity tolerance (7.1 dSm^{-1}) than that of sorghum crop (4.8 dSm^{-1}), although the two forage crops attained the same values of the threshold of salinity (4.0 dSm^{-1}). In the 2nd cut, irrespective of N fertilizer either soil or foliar applications, pearl millet forage crop had about four folds of that obtained for sorghum crop. Regarding application of soil N doses, application of 75% dose showed the highest value of forage yield, whereas, the lowest dose produced the lowest forage yield. This means that fertilized with 75% the recommended dose more suitable under saline conditions of Sinai. In addition, forage yield was increased by 55.8% with increasing foliar application by urea levels from 0.5% to 1.5%.

It could be recommended that pearl millet forage crop is more adapted and suitable for saline conditions at South Sinai governorate, under using soil mulching. Moreover, foliar application of urea at 1.0 and 1.5% with 100, and 75% of recommended N dose and enough to obtain higher return for pearl millet and sorghum forage crops, respectively.

Keywords: Salinity, Calcareous soil, forage crops, Sorghum, Pearl millet, Soil mulching and N application.

INTRODUCTION

According to the increases of challenge to satisfy livestock feeding requirements especially from summer forage crops, in Egypt, intensive efforts are being conducted for enhancing forage production particularly in salt affected natural resources (soil, water). About 33% of total cultivated area in Egypt is affected by salinity due to scarcity of rainfall, surface irrigation system, more using underground or agricultural drainage water. In Sinai Peninsula, salinity is considered the major obstacles to increase summer forage production. There are several approaches to control of salinity hazards such as introducing high yielding forage genotypes under saline conditions, i.e. sorghum, pearl millet crops, using the appropriate agricultural practices for salinity control, i.e. system irrigation, land smoothing and leveling, leaching requirements, soil mulching, suitable and splitting nitrogen dose with foliar application supplementary.

Freshwater shortage is the main problem in South Sinai Governorate, while a considerable amount of underground saline water is available. Moreover, water loss by evaporation from the soil surface beneath crops grown in Mediterranean climates has been shown to be important in influencing crop yield (Perry, 1987 and Siddique *et al*., 1990). They added that about 30-60% of the seasonal evapotranspiration may be lost as evaporation from the soil surface. It is known that the high temperatures and the high evaporation rate, enhancement of salt accumulation on soil surface subsequent to irrigations is inevitable unless using surface protection technique and this can be achieved by using soil surface mulching from cheaply materials and from crops residues. In this respect, Wang *et al*. (2001) indicated that covering the surface with plant residues can reduce radiation and wind speed at the surface and hence, reduce evaporation. Therefore, mulching the soil surface in between rows with crop residue material like straw may help in conserving the soil moisture and salinity control particularly during early growth stages and to some extent, after any cutting. In addition, to prevent the deleterious buildup of salts in the root zone of crops, additional water beyond that needed by the

plant is required to leach salts from the soil profile. In this respect, Yang *et al*. (2006) studied the effect of four treatments of soil mulching material: (1) no mulch, (2) mulch with plastic film, (3) mulch with corn straw, (4) mulch with concrete slab between the rows on wheat production. They noticed that concrete mulch and straw mulch were more effective in conserving soil water compared to plastic film mulch which increased soil temperature. Concrete mulch decreased surface soil salinity much better in comparison with other mulch types. Straw mulch conserved more soil water but decreased wheat grain yield probably due to low temperature. Concrete mulch had similar effect with plastic film mulch on promoting winter wheat development and growth. Moreover, Qing *et al*. (2009) Found that mulching with rice straw or gravel increased fresh, dry yield of Swiss chard (*Beta vulgaris* L. var. flavescens), water use efficiency and reduced salt accumulation in the top 25 cm, evapotranspiration as compared with no mulching. According to the salt index expression, soil application of any fertilizer increased osmotic pressure of soil solution (Andhale *et al*., 2005), therefore, supplementary by foliar application of N may be helpful to minimize soil application and consequently to reduce the impact salinity stress. Andhale *et al*. (2005) added that using 100 and 150% of the recommended fertilizer rate (RDF) of 60:30:30 kg NPK/ha and 50% of RDF + 5 t farmyard manure (FYM)/ha for summer pearl millet, they found that fertilizer treatment with 150% of the RDF recorded the highest ear head weight/plant, 1000-seed weight, total biomass, grain yield and straw yield, whereas 50% RDF + FYM recorded the highest harvest index. Nutrient disturbances under salinity reduce plant growth by affecting the availability, transport, and partitioning of nutrients. However, salinity can differentially affect the mineral nutrition of plants. Salinity may cause nutrient deficiencies or imbalances, due to the competition of Na+ and Cl– with nutrients such as K^+, $Ca2^+$, and $NO3^-$. Under saline conditions, a reduced plant growth due to specific ion toxicities (e.g. Na^+ and Cl^-) and ionic imbalances acting on biophysical and/or metabolic components of plant growth occurs (Grattan and Grieves, 1999). Increased NaCl concentration has been reported to induce increases in Na and Cl as well as decreases in N, P, Ca, K and Mg level in fennel (Abd El-Wahab, 2006)

The present investigation was aimed to evaluate the response of two forage crops, sorghum and pearl millet to some agricultural practices of salinity control as soil mulching and N fertilizer management under saline water irrigation in South Sinai, Egypt.

MATERIALS AND METHODS

Two field trials were conducted at the Experimental Farm of South Sinai Research Station (belongs to Desert Research Center, Egypt), Ras Sudr, South Sinai Governorate during summer growing seasons of 2008 and 2009, using saline irrigation water. The Farm soil was characterized by calcareous soil (53.6% CaCO3), with pH values of 7.5-8.1, sandy to sandy loam as soil texture conditions. However, the irrigation water was saline of 4000 ppm with pH value; Cl^- and Na^+ were 7.66, 40.5 meq/l and 30.8 meq/l, respectively. The 1st trial was carried out to study the response of two forage crops: sorghum, Hybrid 102, (*Sorghum bicolor L. Moench*) and pearl millet, Shandweel 1, (*Pennisetum glaucum L.,R. Br.*) to soil mulching with defoliated leaves of Casuarina sp. or without mulching. The experimental design was split plot with 3 replicates, forage crops were occupied the main plots, whereas soil mulching treatments were allocated in sub plots. Each sub-plot contains 10 rows, 70 cm apart, with 5 m in length. The 2nd trial was conducted to evaluate the effect of different N rates as soil application from 100, 75 and 50% of N dose recommended of 80 kg/ha as a basal dose as well as after any cut and foliar application with 0.5, 1.0 and 1.5% urea before 2-3 weeks from any cutting time on the above mention of two forage crops. The experimental design was split split-plot design with 3 replicates, forage crops were occupied the main plots, soil N application were allocated in sub plots and foliar by urea were allocated in sub sub-plots. Each sub sub-plot contains 3 rows, 70 cm apart, with 10 m in length. Amounts of 20 m^3 organic manure, 100 kg sulfur, 30 kg P2O5 and 24 kg K2O/ha were added to the soil after ploughing and leveling of the land surface at slope of 0.15 - 0.18% to establish irrigation system of the performed gated pipes with spacing 70 cm apart. Sorghum and pearl millet grains were sown on 20 April, in the two seasons at rates of 60 and 40 kg/ha, respectively using drill method in rows on double row slopping beds of furrows and then covering by mixture of soil and organic manure for the two trials. Moreover, in the 1st trial, soil mulching by defoliated leaves of *Casuarina sp*. was carried out after sowing and covering, A basal N dose of 80 kg/ha was added after 30 days from sowing date and after every cut. In the 2nd trial, nitrogen soil applications was applied at doses of 100, 75, 50% of the recommended dose (80 kg N/ha) as a basal dose after 30 days from sowing date as well as after every cut. Foliar application of urea i.e. 0.5 %, 0.1 % and 1.5% were applied after three weeks from the 1st and 2nd cuts at rate of 600 L/ha using tween 20 as a reagent. Soil moisture content, plant height, number of tillers/m^2, fresh and dry weight of forage yield (ton/ha) at 1st, 2nd and 3rd cuts were recorded. All data were analyzed statistically according to the procedures outline by Snedecor and Cochran (1967). Duncan's multiple range test was used to verify the significant difference between means of treatments (Duncan, 1955). Means followed by the same small letters within columns or the same capital letters within a column or row were not significant at 5% probability level.

RESULTS AND DISCUSSION

In the first experiment data in Table 1 showed that the effect of soil mulching treatments on some growth traits of sorghum and pearl millet crops at 1st, 2nd

and 3rd cuts indicated that pearl millet forage crop had a significant increase in fresh and dry forage yield at 1st and 2nd cuts. These results may be due to significant increase in plant height and number of tillers/m^2 of pearl millet crop. It seems that sorghum forage crop was not able to produce any regrowth with very slowly development at 3rd cut. These findings indicated that pearl millet forage crop more adapted to salinity conditions of Sinai governorate. These results may be attributed to the fact that pearl millet forage crop showed higher value of slope for salinity tolerance (7.1 dSm^{-1}) than that of sorghum crop (4.8 dSm^{-1}), although the two forage crops have the same values of the threshold of salinity (4.0 dSm^{-1}). Concerning soil mulching practice, plant height, tillers number, fresh forage yield and dry forage yield, at any cut, were increased significantly with soil mulching. Soil mulching practice had about two folds in fresh and dry forage yield as compared with without soil mulching treatment. Similar findings were reported by Perry (1987). The beneficial effect of soil mulching practice under salinity conditions may be due to the lower evaporation, increasing soil moisture conserving , reducing water stress and salinity control particularly during early growth stages and after any cutting. In this respect, Perry (1987) and Siddique *et al*. (1990) noticed that about 30-60% of the seasonal evapotranspiration may be lost as evaporation from the soil surface beneath crops grown in Mediterranean climates which has been shown to be important in influencing crop yield. Thus, the improvement of salt tolerance by alters some environmental factors may also greatly increase water use efficiency for plant growth and/or reduced the quantity of water required. Certainly, more work needs to be done on these relationships.

Table 1 :Effect of soil mulching treatments on some growth traits of sorghum and pearl millet forage crops at 1st, 2nd and 3rd cuts under salinity conditions (Average of the two growing seasons 2008 and 2009)

	Plant ht. (cm)			No. of tillers/m^2			Fresh forage yield (t/ha)			Dry forage yield (t/ha)		
Soil mulching Treatments	**Sorghum**	**Pearl millet**		**Sorghum**	**Pearl millet**		**Sorghum**	**Pearl millet**	**Mean**	**Sorghum**	**Pearl millet**	**Mean**
						1st cut (21 / 6)						
Without mulching	112.2 c	137.8 b	125.0 A	142.4 b	171.5 b	156.9 B	9.13 b	24.01 b	16.57 B	1.915 b	3.964 ab	2.940 A
Soil mulching	114.3 c	157.4 a	135.9 A	259.8 ab	348.5 a	304.2 A	20.68 b	43.42 a	32.05 A	3.408 ab	5.373 a	4.391 A
Mean of forage crops	113.3 B	147.6 A		201.2A	260.0 A		14.90 B	33.72 A		2.661B	4.669 A	
						2nd cut (31 / 7)						
Without mulching	72.9 b	148.3 a	110.6 A	60.7 b	90.3 ab	75.5 B	5.560 c	29.32 b	17.44 B	1.420 c	6.456 b	3.938 B
Soil mulching	75.3 b	164.3 a	119.8 A	79.7 ab	157.3 a	118.5 A	6.047 c	41.95 a	24.00 A	1.779 c	9.535 a	5.656 A
Mean of forage crops	74.1B	156.3 A		70.2 B	123.8 A		5.80 B	35.63 A		1.599 B	7.995 A	
						3rd cut (12 / 9)						
Without mulching	-	123.3 b	-	-	57.67 a	-	-	21.5 b	-	-	5.003 b	-
Soil mulching	-	183.3 a	-	-	45.33 b	-	-	29.5 a	-	-	6.579 a	-
Mean	-	153.3	-	-	51.50	-	-	25.5	-	-	5.791	-

Means followed by the same small letters within columns or the same capital letters within a column or row were not significant at 5% probability level.

In the second experiment Table (2) illustrated the effect of soil application of nitrogen fertilizer on sorghum and pearl millet forage crops at the 1st cut. Data obtained indicated that fresh or dry forage yields of the 1st cut were reduced significantly with decreasing soil N application from 100% to 50% of N dose. The same trend was obtained for plant height. Fresh and, to some extent, dry forage yields of pearl millet crop produced about two folds of sorghum crop under salinity conditions. However, forage yield of sorghum and pearl millet crops were reduced about 43.2% and 29.7%, respectively with decreasing N doses from 100 to 50% of the recommended dose. Such trends were in agreement with those obtained by Maas and Hoffman (1977). These results may be attributed to increasing plant height and tillers number of pearl millet crop, as comparing with sorghum crop. These traits were increased significantly with the higher N dose recommendation. In this respect, according to Maas and Hoffman (1977), pearl millet forage crop exhibited lower value of slope for salinity tolerance (4.8 dSm^{-1}) than that of sorghum crop (7.1 dSm^{-1}). However, the two forage crops showed the same values of salinity threshold (4 dSm^{-1}), the maximum allowable salinity without yield reduction. These findings indicated that pearl millet forage crop was more adapted to salinity conditions of Sinai governorate

Results presented in Table (3) showed the effect of soil and foliar application of nitrogen fertilizer on some growth traits of sorghum and pearl millet forage crops at 2nd cut. Irrespective of N fertilizer either soil or foliar applications, pearl millet crop attained about four folds in fresh or dry forage yields of that recorded in sorghum crop.

Table 2:Effect of soil application of nitrogen fertilizer on sorghum and pearl millet forage crops, at 1st cut, under salinity conditions (Average of the two growing seasons 2008 and 2009)

Soil application of N dose recommended	Sorghum	Pearl millet	Mean 1st cut (21 / 6)	Sorghum	Pearl Millet	Mean
	Plant height (cm)			Number of tillers/m^2		
100%	112.1bc	162.3 a	137.2 A	36.0 d	95.3 ab	65.6 B
75%	98.3 c	135.2 ab	116.8 B	74.3 c	109.5 a	91.9 A
50%	93.9 c	114.8 bc	104.4 B	52.5 d	85.5 bc	69.0 B
Mean of forage crops	101.4 B	137.4 A		54.3 B	96.8 A	
	Fresh forage yield(t/ha)			Dry forage yield (t/ha)		
100%	11.37 bc	22.77 a	17.07 A	2.085 c	4.059 a	3.072 A
75%	10.26 bc	21.28 a	15.77 AB	2.007 c	3.712 ab	2.859 AB
50%	6.46 c	16.0 ab	11.23 B	1.372 c	2.532 bc	1.952 B
Mean of forage crops	9.36 B	20.02A		1.822 B	3.434 A	

Means followed by the same small letters within columns or the same capital letters within a column or row were not significant at 5% probability level.

These results may be attributed to significantly increase in plant height and tillers number of pearl millet crop. These findings of 1st and 2nd cuts indicated that pearl millet forage crop was more adapted to salinity conditions of Sinai governorate. These results may be due to pearl millet forage crop had the higher value of slope for salinity tolerance (7.1 dSm^{-1}) than that of sorghum crop (4.8 dSm^{-1}), although the two forage crops have the same values of the threshold of salinity (4.0 dSm^{-1}) according to Maas and Hoffman (1977).

Table3:Effect of soil and foliar application of nitrogen fertilizer on some growth traits of sorghum and pearl millet forage crops at2nd cut under salinity conditions(Average of the two growing seasons 2008 and 2009).

Soil application of N dose recommended	Foliar Application of urea levels (%)	Sorghum	Pearl millet	Mean 2nd cut (31 / 7)	Sorghum	Pearl Millet	Mean
		Plant height (cm)			Number of tillers/m^2		
100%	0.5%	56.5 f	125.5 d	91.0 cd	69.8 ghi	120.8 bc	95.3 cd
	1.0%	62.0 f	158.0 ab	110.0 b	50.3 j	105.8 cd	78.02 e
	1.5%	89.5 e	170.5 a	130.0 a	29.3 k	75.0 fg	52.1 f
	Mean	69.3 c	151.3 a	110.3 A	49.8 e	100.5 b	75.1 C
75%	0.5%	49.5 f	152.5 ab	101.0 bc	91.5 def	124.5 bc	108.0 bc
	1.0%	52.5 f	156.0 ab	104.3 b	54.8 hij	73.5 fgh	64.1 f
	1.5%	63.5 f	133.5 d	98.5 bc	83.3 efg	100.5 de	91.9 d
	Mean	55.2 d	147.3 a	101.2B	76.5 d	99.5 b	88.0 B
50%	0.5%	54.5 f	100.5 e	77.5 e	120.8 bc	87.8 d-g	104.3 bcd
	1.0%	61.5 f	102.0 e	81.8 de	51.0 ij	210.8 a	130.9 a
	1.5%	58.5 f	146.5 bc	102.5 bc	85.5 efg	135.0 b	110.3 b
	Mean	58.2 d	116.3 b	87.3 C	85.8 c	144.5 a	115.1 A
Mean of forage crops		60.9 B	138.3 A		70.7 B	114.8 A	
Mean of urea levels	0.5%	53.3 e	126.2 c	89.8 C	94.0 c	111.0 b	102.5 A
	1.0%	58.7 e	138.7 b	98.7 B	52.0 e	130.0 a	91.0 B
	1.5%	70.5 d	150.1 a	110.3 A	66.0 d	103.5 bc	84.8 B
		Fresh forage (t/ha)			Dry forage (t/ha)		
100%	0.5%	5.13 e	21.42 cd	13.29 cd	1.169 g	4.572 d-f	2.870 bc
	1.0%	6.08 e	23.94 c	15.01 b-d	1.239 g	5.047 c-e	3.143 bc
	1.5%	6.55 e	31.70 ab	19.13 ab	1.408 g	6.648 bc	4.028 bc
	Mean	5.92 de	25.68 b	15.80 B	1.272 de	5.423 b	3.347 B
75%	0.5%	4.10 e	25.85 bc	14.99 b-d	0.948 g	5.557 b-d	3.253 bc
	1.0%	4.99 e	32.72 ab	18.86 a-c	1.073 g	7.036 ab	4.054 ab
	1.5%	4.44 e	38.83 a	21.63 a	0.954 g	8.348 a	4.651 a
	Mean	4.51 e	32.47 a	18.49 A	0.992 e	6.980 a	3.986 A
50%	0.5%	6.67 e	14.85 d	10.76 d	1.433 g	3.192 f	2.313 c
	1.0%	5.07 e	18.01 cd	11.54 d	1.089 g	3.872 ef	2.481 c
	1.5%	7.24 e	23.80 c	15.52 b-d	1.556 g	5.117 c-e	3.336 bc
	Mean	6.32 d	18.89 c	12.60 C	1.360 d	4.060 c	2.710 C
Mean of forage crops		5.58 B	25.68 A		1.208 B	5.488 A	
Mean of urea levels	0.5%	5.30 c	20.70 b	13.00 B	1.183 d	4.440 c	2.812 B
	1.0%	5.38 c	24.89 b	15.13 B	1.134 d	5.318 b	3.226 B
	1.5%	6.07 c	31.44 a	18.76 A	1.306 d	6.704 a	4.005 A

Means followed by the same small letters within columns or the same capital letters within a column or row were not significant at 5% probability level.

Regarding of soil N application; 75% of N dose recommendation recorded the highest values of fresh and dry forage yields. Whereas the least dose produced the lowest one. It means that fertilizer with 75% of the recommended dose of N was enough and more suitable under saline conditions of South Sinai. These findings may be due to increasing osmotic pressure of growing media with the highest value of N dose as soil application. Fresh and dry forage yields were significantly increased by 44.3 and 42.4%, respectively with increasing foliar application of urea levels from 0.5 to 1.5%. These results may be due to significant increase of plant height with the highest urea level. Regarding to the response of the two forage crops to soil or foliar application of N fertilizer, data in Table 3 indicated that pearl millet forage crop recorded approximately 4.3, 7.2 and 3.0 folds, in fresh forage yield, more that those of sorghum crop with soil application of 100%, 75% and 50 % from the recommended N dose, respectively. Moreover, pearl millet recorded around 3.9, 4.6 and 5.2 folds, in fresh forage compared to that obtained in sorghum with foliar application of 0.5, 1.0 and 1.5% urea, respectively. In this respect, Sarhan and Hammad (1995) reported that harvest index and straw yield of wheat were significantly increased by increasing urea level up to 1.0 and 1.5%, respectively.

Results presented in Table 4 showed the effect of soil and foliar applications of N fertilizer on pearl millet forage crop at the 3rd cut under saline conditions. Plant height, fresh and dry weight of the forage yields were decreased significantly with reducing soil N application from 100% to 75% or 50% of the recommended dose. Although, the differences between the lower rates of soil N application did not reach to a significant level. Moreover, number of tillers/m2 did not affected significantly by soil N or foliar application of urea treatments. Regarding foliar application by urea levels, plant height; fresh and dry forage yields were significantly increased with increasing urea level from 0.5% to 1.0%. Insignificant increase in the above characters was obtained by raising foliar application with urea from 1.0% to 1.5% level. So, foliar application by urea at 1.0% level was enough to obtain satisfactory results under salinity conditions. Concerning the interaction between soil N and foliar application by urea level, data presented in Table 4 appeared that 100% of the recommended soil N application produced the highest values of plant height, tillers number/m2, fresh and dry forage yields at 1.5, 0.5, 1.0 and 1.0% urea levels, respectively. The inverse relationship between plant height and tillers number may be attributed to mode of action of urea application for increasing cell elongation of cereal crops (Mohamed and Mohamed, 1993).

Table 4: Effect of soil and foliar application of nitrogen fertilizer on pearl millet forage crop at the 3rd cut under salinity conditions (Average of the two growing seasons 2008 and 2009)

Soil application of N dose recommended	Foliar application of urea levels (%)	3rd cut (12 / 9) Plant height (cm)	Number of tillers/m^2	Fresh forage yield (t/ha)	Dry forage yield (t/ha)
100%	0.5%	98.3 abc	71.0 a	6.277 c	1.506 c
	1.0%	119.0 ab	56.7 ab	11.474 a	2.690 a
	1.5%	125.0 a	48.7 b	10.797 ab	2.427 ab
	Mean	114.1 A	58.8 A	9.517 A	2.208 A
75%	0.5%	88.3 c	38.0 b	5.727 c	1.374 c
	1.0%	96.7 abc	41.3 b	7.153 bc	1.717 bc
	1.5%	102.7 abc	40.3 b	9.250 abc	2.187 abc
	Mean	95.9 B	39.9 A	7.377 B	1.761 B
50%	0.5%	86.7 c	55.0 ab	7.200 bc	1.728 bc
	1.0%	93.3 bc	52.7 ab	7.150 bc	1.716 bc
	1.5%	101.7 abc	55.7 ab	7.650 bc	1.836 abc
	Mean	93.9 B	54.5 A	7.333 B	1.760 B
Mean of urea levels	0.5%	91.1 B	54.7 A	6.401 B	1.536 B
	1.0%	103.0 AB	50.2 A	8.593 A	2.041 A
	1.5%	109.8 A	48.2 A	9.232 A	2.150 A

Means followed by the same small letters within columns or the same capital letters within a column or row were not significant at 5% probability level.

Therefore, it is concluded that pearl millet as forage crop was preferred than sorghum forage crop under salinity conditions with safety soil N application at 100% of the recommended dose , which added by using spraying as 1.0% urea. Since pearl millet does not produce prussic acid, this species has a distinct advantage over sorghum. This allows pearl millet to be grazed or harvested at any growth stage without the risks associated with prussic acid poisoning to small ruminants.

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مقارنة اداء محصولي العلف السورجم والدخن باستخدام إدارة زراعية مختلفة تحت الظروف الملحية

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اجريت تجربتان حقليتان بمحطة بحوث رأس سدر التابعة لمركز بحوث الصحراء بجنوب سيناء خلال الموسمين الصيفيين ٢٠٠٨ و ٢٠٠٩ وتهدف الدراسة الي مقارنة اداء محصولي العلف السورجم والدخن تحت ظروف المناطق الملحية ودراسة كفاءة استخدام اوراق الجازورينا المتساقطة بالمزرعة في تغطية سطح التربه علي انتاجية السورجم والدخن وتاثير اضافة التسميد النيتروجيتي ارضي او بالرش علي انتاجية السورجم والدخن بالمناطقالمتاثرة بالملوحة. وقد اظهرت النتائج المتحصل عليه ما يلي:

١- اظهرت النتائج المتحصل عليها تفوق معاملة تغطية سطح التربة باوراق اشجار الجازورينا تفوقا معنويا علي معاملة عدم التغطية في كل من صفات ارتفاع النبات وعدد الافرع/م٢ والوزن الغض والجاف لكلا المحصولين السورجم والدخن والذي قد يرجع الي زيادة المحتوي الرطوبي بالتربة لمعاملات التغطية خاصة في الحشة الاولي وقد انخفضت تلك الزيادة تريجيا مع الحشات التالية (الثانية والثالثة) والتي ربما قد ترجع الي التغطية الذاتية لبقايا النباتات التي تم حشها في الحشة الاولي

٢- اوضحت النتائج تفوق اداء محصول الدخن علي محصول السورجم تحت ظروف التغطية للصفات المذكورة سابقا

٣- اشارت النتائج الي انخفاض محصول العلف الاخضر للحشة الاولي لكل من الدخن والسورجم انخفض معنويا بانخفاض معدل التسميد النيتروجيني من ١٠٠ % الي ٥٠ % من الموصي به

٤- اظهرت النتائج انخفاض محصول العلف الاخضر لمحصول السورجم الي ٤٣% نتيجة انخفاض الجرعة السمادية من النيتروجين من ١٠٠ % الي ٥٠% من الموصي به بينما وصل الانخفاض في محصول العلف الاخضر لمحصول الدخن الي ٢٩.٧ % فقط نتيجة انخفاض الجرعة السمادية من النيتروجين من ١٠٠ % الي ٥٠% من الموصي به وربما يرجع ذلك الي معدل الاستجابة للملوحة لك من المحصولين والي يصل في الدخن الي 7.1%/dSm-1 بينما يصل في السورجم الي 4.0 dSm-1 فقط

٥- اوضحت النتائج ان استخدام معدل ٧٥ % من السماد النيتروجيني حقق اعلي انتاجية من محصول العلف الاخضر تحت الظروف الملحية

٦- اوضحت الدراسة انه محصول العلف الاخضر زاد ٥٥.٨ % بزيادة الجرعة السمادية لمعاملة التسميد بالرش الورقي باليوريا من ٠.٥ % الي ١.٥ %

٧- توصي الدراسة بافضلية محصول الدخن عن السورجم باستخدام تقنية تغطية سطح التربة والتسميد النيتروجيني الورقي باليوريا ١.٥ % تحت الظروف الملحية في جنوب سيناء