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Impact of Nitrogen Sources on Growth of *Zizyphus spina-christi* (L.) Willd. and *Acacia tortilis* subsp. *tortilis* (Forssk.) Hayne Seedlings Grown under Salinity Stress

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ABSTRACT
The present study was conducted in laboratory and greenhouse of Range and Forestry Applied Research Unit in experimental station of Food and Agriculture Collage, King Saud University, at Dirab Valley, South of Riyadh City, during two successive seasons. The objective was to investigate the impact of two nitrogen sources (Ammonium sulphate and Calcium nitrate) on growth of two economical trees (*Zizyphus spaina-chrsity* (L.)) Desf. and *Acacia tortilis* subsp *tortilis* (Forssk.) under saline stress by using the mixed salts of Sodium and Calcium chloride (1:1 v/v) at concentrations of 1000-5000 ppm. The results indicated that, *Acacia tortillis* subsp. *tortillis* was the most response to the nitrogen source and more tolerant to salinity stress than the *Zizyphus spina-christi* under the field condition. The two nitrogen sources significantly increased the growth properties of the tree species growing under the salinity stress as compared to control treatment (water only). The fertilizers effect has the same effect on the growth of the tree species. The salt concentrations were affecting significantly of the growth of the trees and the most harmed concentration was 5000 ppm as compared with the other concentrations and the control treatment. So, the present study suggested using either the Ammonium sulphate or Calcium nitrate as the nitrogen source can improve the growth and the biomass of *Acacia tortillis* subsp. *tortillis* and *Zizyphus spina-christi* seedlings moreover, increased the salinity tolerant found in the nursery soil at Riyadh City as well as the hazed conditions in the field.

Key words: Nitrogen source, fertilization, salinity, *Acacia* spp., *Zizyphus* spp., Saudi Arabia

INTRODUCTION
Nitrogen is a vital plant nutrient essentially absorbed by plants in the form of ammonium as well as nitrate. The soil solution contains both ammonium and nitrate ions in proportions dependent on several factors including the soil type, nitrogen fertilization and season, the uptake and efficiency of the two ions being largely dependent on plant species, plant age and environmental conditions (Youssef, 2001).

Application of nitrogen fertilizers has a particular importance; because nitrogen is one of the basic elements required by plants. Most of soils do not have enough nitrogen to ensure high yields. The fertilizers have different effects with different agrochemical soil properties. Ammonium sulfate impairs the agrochemical properties of soils and with long term use become ineffective. Many studies have shown that following the application of nitrogen fertilizer to the soil, plants make a better use of nitrogen in the soil. Application of nitrogen fertilizers ensures a large supply of soil nitrogen to plants even in the case of spatial distribution of fertilizer and soil (Korenkov, 1976).

Ion excess effect of salinity caused the habitation of the plant growth and found when the salinity water increased in the soil. The water table continuous to rise and when it comes close to the surface, water evaporates leaving salts behind on the surface and thus forming a salt scales. The mobilized salt can also move laterally to water and increase their salinity (Greenway and Munnus, 1980; Ghassemi *et al.*, 1995).

The weather of central part of Saudi Arabia is dry and very hot with about 50°C from May to October while it is dry and cold in winter when the temperature may drop at night to freezing point. According to these conditions, evaporation from the land increases and the salinity in the land increases so that plant's life cannot be maintained where it comes under salinity stress which may lead to death of plant. In order to solve this problem in Saudi Arabia, efforts are progress for the last three decades. These include selecting species more tolerant to salinity; adopting new irrigation techniques; adopting new fertilizers application and using new fertilizers or other nitrogen sources.

Zizyphus spina-christi and *Acacia tortilis* subsp. *tortillis* are considered as the most popular local trees in Saudi Arabia, but no research has been undertaken so far regarding their ability to endure salinity stress in the seedling stage at least. The aim of the present study was to investigate the impact of two nitrogen sources on growth of two economical trees (*Zizyphus spaina-chrsity* (L.) Desf. and *Acacia tortilis* subsp. *tortilis* (Forssk.)) under saline stress in Riyadh city.

MATERIALS AND METHODS

Site and woody tree species used in the study: Experiment was conducted in Forest Physiology Laboratory and Greenhouse facilities at Plant Production Department , King Saud University, at Dirab Valley, (N.24°24' 33", E.46° 39' 40"), South of Riyadh City, during the two growth seasons (2010-2011) and (2011-2012).

Acacia tortillis subsp. *tortillis* (known as Samar in Saudi Arabia) is a medium to large canopied tree native primarily to the savannah and Sahel of Africa (especially Sudan), but also occurring in the Middle East and Saudi Arabia. In extremely arid conditions, it may occur as a small, wiry bush. The plant is known to tolerate high alkalinity, drought, high temperatures, sandy and stony soils, strongly sloped rooting surfaces and sand blasting.

Zizyphus spina-christi (known as Aberi in Saudi Arabia) is a fruit tree that grows wild in arid and semi-arid areas of Saudi Arabia, Pakistan and Sudan. The fruits, leaves, bark and wood are intensively used by the rural population. Increasing soil salinity is one of the major a biotic factors threatening plant production in these regions. *Zizyphus spina-christi* is considered as the most popular local tree in Saudi Arabia, but it was not subjected to any research dealing with its ability to endure salinity stress in the seedling stage at least. Physical and chemical characteristics of soil are given in Table 1.

Table 1: Physical and chemical analyses of soil

Particle size distribution (%)						Soluble cations (meq L^{-1})			Soluble anions (meq L^{-1})			Mineral elements (ppm)	
Sand	Silt	Clay	Soil texture	pH	EC (m mhos cm^{-1})	Na^+	K^+	Ca^{++}	SO_4^-	CL^-	N	P	OM (%)
77.7	15.0	7.3	Sandy loam	8.4	1.01	1.04	0.52	0.25	7.2	2.2	29.2	7.7	1.0

Plant growth and experimental design: Six month-old seedlings of *Zizyphus* spp. and *Acacia* spp., obtained from forestry Department at Dirab experimental station, were planted on the first week of October 2010 and 2011 in plastic pots 25 cm diameter filled with 10 kg of soil. The seedlings remained in pots till the third week of September 2011 and 2012. Seedlings height and diameter average were taken and each pot contained one or two seedlings. The chemical fertilizers used in this study were Ammonium sulphate $(NH_4)_2SO_4$ (4.9 g for each pot) and Calcium nitrate $(CaNO_3)_2$ (6.5 g for each pot). The mixed salts of Sodium and Calcium chloride (NaCl) and ($CaCl_2$) (1:1 v/v) was used at concentrations of 1000, 2000, 3000, 4000 and 5000 ppm. Two months after transplanting, the fertilizer was applied separately every month until the end of the experiment and irrigation with salt solution in different concentrations. The control treatment was irrigated three times in summer and twice every week in winter. The following parameters of vegetative growth were recorded as following; stem height (cm), stem diameter (cm), branch number/plant, dry weight of stem, branches and root (g) and Chlorophyll A, B and AB (µml L^{-1}). Salt solution was prepared in part per million by using mix of NaCl and $CaCl_2$ at 1, 2, 3, 4 and 5 g L^{-1}, respectively in irrigation water.

Extraction of chlorophylls from leaves with N, N-dimethylformamide (DMF) method: For chlorophyll analysis, weight of leaflets of the tree species were ranged between 0.025-0.035 g to extract chlorophylls with N, N-dimethylformamide (DMF), by grinding with 2 mL of solvent DMF in a mortar with pestle. The homogenate, combined with a further three washings of the pestle and mortar (each of 1.5 mL) with the same solvent, was centrifuged at 2500 rpm in bench centrifuge for 10 min. The pellet was then extracted with a further 1 mL of solvent in homogenizer and the pooled supernatants adjusted to a final volume of 8 mL. The spectrum was recorded between 750 and 600 nm and the major red absorption peak automatically determined by the UV-VIS spectrophotometer-specto UV-2505-Labo med. inc., recording spectrophotometer zeroed at 750 nm. The Chls a, b, Chls a+b concentrations in μmol/L were then calculated using the equations described below (Porra *et al*., 1989):

$$\text{Chl. a} = 13.43\, A^{663.8} - 3.47\, A^{646.8}$$

$$\text{Chl. b} = 22.90\, A^{663.8} - 5.38\, A^{646.8}$$

$$\text{Chl. a+b} = 19.43\, A^{663.8} - 8.05\, A^{646.8}$$

Statistical analysis: Data were statistically analyzed for growth parameters, chlorophyll concentrations using analysis of variance procedure for split-split plot design in RCBD as described by Gomez and Gomez (1984). Means of treatments were compared with the Least Significant Difference Test (LSD) at 0.05 level of probability (Snedecor and Cochran, 1980).

RESULTS

Effect of Nitrogen sources under salinity on growth properties of tree species: The impact of nitrogen sources under salinity stress between tree species at growth properties during the two seasons showed that no significant difference was found between tree species on seedlings height and diameters. *Acacia tortillis* subsp. *tortilles* had the highest seedlings height than *Zizphus spina-christi* with averages 62.08, 61.86, 52.53 and 48.24 cm, respectively. The same

Table 2: The impact of nitrogen sources under salinity stress between tree species at growth properties during the two seasons

	Tree species			
	Acacia tortillis subsp. *tortillis*		*Zizyphus spina-christi*	
Parameters	First season	Second season	First season	Second season
Height (cm)	62.08[a]	61.86[a]	52.53[a]	48.24[a]
Diameter (mm)	5.18[a]	5.25[a]	4.95[a]	4.55[a]
Dry stem weight (g)	4.11[a]	4.30[a]	2.23[b]	1.81[a]
Dry weight root (g)	6.22[a]	6.69[a]	3.87[b]	3.56[b]
Dry weight branches (g)	4.35[a]	5.06[a]	1.57[b]	1.39[b]
No. of branches	2.66[a]	2.68[a]	2.54[a]	2.11[a]
Chlorophyll A (μml L^{-1})	6.67[a]	6.62[a]	6.03[a]	5.99[a]
Chlorophyll B (μml L^{-1})	2.04[a]	2.03[a]	1.61[a]	1.51[a]
Chlorophyll AB (μml L^{-1})	8.71[a]	8.65[a]	8.64[a]	8.65[a]

trends was found at the diameter, *Acacia tortillis* subsp. *tortilles* had the biggest diameter than *Zizphus spina-christi*. The averages were 5.18, 5.25, 4.95 and 4.55 mm, respectively (Table 2). Significant differences were found between species at dry weight of stem, root and branches. The data indicated that *Acacia tortillis* subsp. *tortillis* gave the higher dry weight of stem, root and branches than *Zizphus spina-christi* at the two seasons (Table 2).

Moreover, the dry weight of stem, root and branches were significant differences between the tree species. *Acacia tortillis* subsp. *tortillis* gave the higher averages of dry weight of stem, root and branches while no significant was found at number of branches than the *Zizyphus spina christi* during the two seasons (Table 2).

For the chlorophyll concentrations, the analysis of variances showed no differences was found between tree species at the two seasons. *Acacia tortillis* subsp. *tortillis* gave the highest chlorophyll A, B and AB concentrations than *Zizphus spina-christi*. The averages of chlorophyll A, B and AB of *Acacia tortillis* subsp *tortillis* were 6.67, 6.62, 2.04, 2.03, 8.71 and 8.85 μml L^{-1}, respectively while for *Zizphus spina-christi,* averages were 6.30, 5.99, 1.61, 1.51, 8.64 and 8.65 μml L^{-1}, respectively (Table 2).

The effect of nitrogen fertilizer type showed that, no differences were found between the two nitrogen fertilizers type on growth of tree species used in the study. The calcium nitrate ($CaNO_3$) gave the higher seedlings height and diameter (61.53 cm and 5.20 mm) as compared with ammonium sulphate $(NH_4)_2SO_4$) (53.52 cm and 4.94 mm) at first season while the second season the averages were 55.32 cm, 5.02 mm and 54.80, 4.79 mm, respectively (Table 3).

Meanwhile, the ammonium sulphate $(NH_4)_2SO_4$) gave the higher values at dry weight of stem, dry weight of branches and number of branches at the two seasons as compared with calcium nitrate ($CaNO_3$). The averages were 3.18, 3.07 g for stem dry weight and 2.96, 3.37 g for branches dry weight, respectively. On the other hand the calcium nitrate ($CaNO_3$) gave a higher value at number of branches (2.64 and 2.40) than ammonium sulphate $(NH_4)_2SO_4$) (2.56 and 2.38) at the two seasons. Root dry weight was varied between the two fertilizers at the two seasons. Ammonium sulphate $(NH_4)_2SO_4$) was higher at the second season (5.46 g) than calcium nitrate ($CaNO_3$) while the calcium nitrate ($CaNO_3$) had a higher value at the first season (5.14 g) than ammonium sulphate (Table 3).

Table 3: Effect of nitrogen fertilizer type under salinity stress on growth properties of tree species

	Fertilizers			
	Ammonium sulphate $(NH_4)_2SO_4$		Calcium nitrate $(Ca\ NO_3)_2$	
Parameters	First season	Second season	First season	Second season
Height (cm)	53.52[a]	54.80[a]	61.53[a]	55.32[a]
Diameter (mm)	4.94[a]	4.79[b]	5.20[a]	5.02[a]
Dry stem weight (g)	3.18[a]	3.07[a]	3.16[a]	3.03[a]
Dry weight root (g)	4.96[a]	5.46[a]	5.14[a]	4.75[a]
Dry weight branches (g)	2.96[a]	3.37[a]	2.95[a]	3.07[a]
No. of branches	2.56[a]	2.38[a]	2.64[a]	2.40[a]
Chlorophyll A (μml L^{-1})	5.96[a]	5.86[a]	6.78[a]	6.88[a]
Chlorophyll B (μml L^{-1})	1.62[b]	1.50[b]	2.05[a]	2.10[a]
Chlorophyll AB (μml L^{-1})	8.35[a]	8.07[a]	8.17[a]	9.35[a]

Table 4: Effect of salt concentrations (salinity stress) on growth properties of tree species

	Salt concentrations (ppm)					
Parameters	Control	1000	2000	3000	4000	5000
Height (cm)	63.08[a]	56.67[a]	59.17[a]	59.93[a]	63.38[a]	41.58[b]
Diameter (mm)	5.65[a]	5.36[a]	5.28[a]	5.16[a]	5.38[a]	3.85[b]
Dry stem weight (g)	3.07[ab]	3.04[ab]	3.85[a]	3.40[a]	3.85[a]	2.09[b]
Dry weight root (g)	5.46[a]	5.10[a]	5.62[a]	5.32[a]	5.54[a]	3.25[a]
Dry weight branches (g)	2.75[a]	3.56[a]	2.41[a]	2.87[a]	3.97[a]	2.18[a]
Number of branches	2.74[a]	2.63[ab]	2.60[ab]	2.59[ab]	2.70[a]	2.32[b]
Chlorophyll A (μml L^{-1})	12.16[a]	7.80[b]	7.97[b]	3.50[c]	3.44[c]	3.22[c]
Chlorophyll B (μml L^{-1})	3.20[a]	2.27[b]	2.24b	1.44[c]	0.96[d]	0.84[d]
Chlorophyll AB (μml L^{-1})	15.36[a]	10.04[b]	10.24[b]	8.04[c]	4.36[d]	4.02[d]

The concentration of chlorophyll B was higher in seedlings treated with calcium nitrate ($CaNO_3$) under salinity stress (2.05 and 2.10 μml L^{-1}) as compared with Ammonium Sulphate $(NH_4)_2\ SO_4$) (1.62 and 1.50 μml L^{-1}) at the two seasons.

Effect of salinity concentrations on growth properties of tree species

First season: With regards to the effect of salt concentrations used with the seedlings under the nitrogen sources, data presented in Table 4 indicated that highly significant differences was found between the salt concentrations at seedlings height and diameter. The treatment of 5000 ppm of mixed salts ($CaCl_2$+NaCl (1:1 v/v)) was the most affected salt concentration on the seedlings height and diameter with mean 41.58 cm and 3.85 mm, respectively. The other salt concentrations and the control treatment were varied in the effect on the seedlings height and diameter. The highest values were found at 4000 ppm (63.38 cm and 5.38 mm) and control treatment (63.08 cm and 5.65 mm) followed by the 3000 ppm (59.93 cm and 5.16 mm), 2000 ppm (59.17 cm and 5.28 mm) and 1000 ppm (56.67 cm and 5.36 mm), respectively (Table 4).

No significant were found between the salt concentrations at dry weight of root and dry weight of branches, but a significant difference was found at the interaction between the tree species and salt concentrations. The growth properties of tree species were affected with treatment of salt concentrations. The salt concentrations were varied in their effect on stem dry weight, the treatments of 2000 and 4000 ppm had the highest values (3.85 g) followed by 3000 ppm (3.40 g) and the control treatment (3.07 g) while the treatment of 5000 ppm had the lowest value with mean 2.09 g, respectively. The same trends were found at the dry weight of root. The treatment of 2000 ppm gave the highest mean (5.62 g) as compared with the other treatments while the lowest value was found at treatment of 5000 ppm (3.25 g) Table 4. For the dry weight of branches, the data indicated variability in the values between the salt concentrations. The salt treatment 4000 ppm had the highest value (3.97 g) while the smallest mean value (2.18 g) was found at 5000 ppm. The number of branches per plant under the salinity treatment was also affected with the salt concentrations. The control treatment gave the biggest value (2.74 branch/plant) followed by the treatment of 4000 pmm. The smallest value of number of branches found at treatment of 5000 pmm (2.32 branch/plant).

The chlorophyll concentration was highly significant with salt treatment used in the study. The salt treatment reduced the chlorophyll concentration with the increased the salt concentration. The control treatment gave the highest values at chlorophyll A, chlorophyll B and chlorophyll AB. The mean were 12.16, 3.20 and 15.36 µml L^{-1}, respectively (Table 4). The treatment of 5000 pmm was the most affected on the chlorophyll concentration, it reduced the chlorophyll concentration in the plant. The mean were 3.22 µml L^{-1} for chlorophyll A, 0.84 µml L^{-1} for chlorophyll B and 4.02 µml L^{-1} for the chlorophyll AB, respectively (Table 4).

Second season: The data obtained from the second season had the same trends as the first season. No significant differences was found between the tree species , fertilizer types and the salt concentrations at stem, root and branches dry weight. Also highly significant was found at seedlings height, diameter, chlorophyll A, B and chlorophyll AB. Salt concentrations was affected on the seedlings height and diameter, the most salt concentration affected on the height was 5000 ppm with average 42.31 cm and 3.72 mm while the control had the highest seedlings height and diameter (63.33 cm and 5.83 mm), respectively (Table 5).

A highly significant difference was found between salt concentrations and growth properties. The salt concentration 4000 pmm had the highest stem dry weight (3.94 g) compared with the other salt concentrations while the 5000 ppm had the lowest stem dry weight (2.07 g). The same direction for the rood dry weight and branches dry weight were observed but the highest values were found at control treatment at root, branches dry weight and number of branches (Table 5).

Table 5: Effect of salt concentrations on growth properties of tree species at second season

	Salt concentrations (ppm)					
Parameters	Control	1000	2000	3000	4000	5000
Height (cm)	63.33[a]	47.50[b]	58.96[a]	59.72[a]	58.47[a]	42.31[b]
Diameter (mm)	5.83[a]	4.84[b]	4.87[b]	5.26[ab]	4.88[b]	3.72c
Dry stem weight (g)	3.11[abc]	2.65[bc]	2.93[abc]	3.64[ab]	3.94[a]	2.07[c]
Dry weight root (g)	6.11[a]	4.97[ab]	5.90[ab]	5.45[ab]	4.87[ab]	3.48[b]
Dry weight branches (g)	3.83[a]	2.54[a]	3.72[a]	3.78[a]	2.66[a]	2.84[a]
Number of branches	2.62[a]	2.18[bc]	2.58[a]	2.49[ab]	2.38[abc]	2.09[c]
Chlorophyll A (µml L^{-1})	12.23[a]	7.79[b]	7.80[b]	3.53[c]	3.54[c]	3.42[c]
Chlorophyll B (µml L^{-1})	3.20[a]	2.26[b]	2.29[b]	1.34[c]	0.99[d]	0.88[d]
Chlorophyll AB (µml L^{-1})	15.46[a]	10.14[b]	10.34[b]	8.08[c]	4.26[d]	4.04[d]

The chlorophyll concentration was highly significant with salt treatments moreover, there are opposite relation between the salt concentrations and chlorophyll concentrations at the plants. The control treatment gave the highest values at chlorophyll A, chlorophyll B and chlorophyll AB compared with the other salt concentrations (Table 5).

DISCUSSION

Nitrogen is the mineral element that plants require in the largest amounts and is a constituent of many plant cell components, including amino and nucleic acids. Therefore, nitrogen deficiency rapidly inhibits plant growth (Hu and Schmidhalter, 2005). Also the bio-NPK treatment in the soil applied significantly increased all leaf amino acid content and mineral composition and total carbohydrates (Osman, 2010). In the present study, the results demonstrated that growth parameters and the growth properties of both the tree species (*Acacia tortillis* subsp. *tortillis* and *Zizyphus spina-christi*) were responded well to the Nitrogen sources, this results were in harmony with results of (Bargali and Singh, 1993; El-Kohen and Mousseau, 1994). Application of nitrogen fertilizers has a particular importance; because nitrogen is one of the basic elements required by plants. Most of soils do not have enough nitrogen to ensure high yields. The fertilizers have different effects with different agrochemical soil properties. From the results, the fertilizers play an important roll in the growth of the seedlings of trees (Hu and Schmidhalter, 2005; Berger and Glatzel, 2001; Gbadamosi, 2006; Oskarsson *et al*., 2006; Oskarsson and Brynleyfsdottir, 2009; Dianda *et al*., 2009). Both the two fertilizers type has the same effect on the growth of the tree seedlings and the photosynthesis. The Calcium nitrate ($CaNO_3$) has a good response on the diameter and seedlings height in the nursery. Meanwhile the Ammonium Sulphate $(NH_4)_2SO_4$ have significant effect on the growth properties of the two tree species specially the dry weight of stem, root and the branches as well as the number of leaves. The results were an agreement with results of Oliet *et al*. (2004), Oskarsson and Brynleyfsdottir (2009) and Osman *et al*. (2010). The chlorophyll concentration also affected with the N sources and Nitrogen fertilizers application. The concentration of chlorophyll B was higher in seedlings treated with Calcium nitrate ($CaNO_3$) under salinity stress as compared with Ammonium Sulphate $(NH_4)_2$ SO_4) while the chlorophyll A and the chlorophyll AB concentrations were varied between the two fertilizers. The results obtained from the present study were an agreement with results of Chartzoulakis (2005) and Tabatabaei (2006). On the other hand the results were disagreement with the results of Kao *et al*. (2001) and Gebauer *et al*. (2004). Also, salinity significantly reduced chlorophyll A; B and AB content with the increased the salt concentrations. This was an agreement with finding of Abdul Qados (2011).

Salinity stress results in obvious stunting symptoms of plants. The immediate response of salt stress is reduction in the rate of leaf surface expansion led to cease of shoot expansion as salt concentration increases. Salt stress also results in a considerable decrease in the fresh and dry weights of leaves, stems and roots. Symptoms of salinity described above have been reported by Wang and Nil (2000), Chartzoulakis and Klapaki (2000) and Parida and Das (2005). For the two tree species, seedlings growth was more affected by salt compared with that obtained in case of root dry and stems weight of legume plant (beans). Salinity was also reported that reduces shoot and root weights in several legumes (Alshammarya *et al*., 2004; Ltaief *et al*., 2007). The results indicate that, salt stress caused a significant depression in seedling growth parameters (height and dry weight of stem as well as root parts of both studied tree species and it seemed to reduce the availability of the nutrients required for the growth and then development of the plants comparing with the control. Meanwhile, salinity affected seedling parameters, in both *Acacia tortilis* and

Zizyphus spina christi. Growth limitation at high salinity may be due to depletion of energy that is needed for growth. These results confirm the previous reported of Cordovilla *et al.* (1995), Tejera *et al.* (2004), Bouhmouch *et al.* (2005) and Imada *et al.* (2009). In fact, under salt stress conditions of soil, chlorine ions limit the absorption of NO_3^-. Antagonistic effect between Cl^-/NO_3^- is well known in glycophytes than halophytes plants; the latter are able to absorb efficiency NO_3^- even under high salt conditions (Bouhmouch *et al.*, 2005). Salinity (a mixture of NaCl and $CaCl_2$) at reduced the kentucky bluegrass growth by 50% at a salt concentration of 7500 ppm (about 11 dSm-1) (Horst and Taylor, 1983) which was higher than the value obtained in this study. (Qian *et al.*, 2001), reported that a 2 dSm^{-1} difference in salinity caused 50% shoot growth reduction in two kentucky bluegrass cultivars. Under salinity concentrations increasing N concentration up to 200 mg L^{-1} in salinity-sensitive cultivars to salinity is favourite while in the salt-tolerant cultivars increasing N fertilization can be an effective tool to restore the decreased growth caused by high salinity (Tabatabaei, 2006).

CONCLUSION

It is concluded from above mentioned results that, *Acacia tortillis* var. *tortillis* was the most response to the nitrogen source and more tolerant to salinity stress than the *Zizyphus spina christi* under the field condition in the Riyadh city.

For the fertilizer used, the results indicated that, there are no differences between the two fertilizer types on the growth of the two tree species. The mean values of the growth properties showed that, the Calcium nitrate ($CaNO_3$) fertilizer gave the higher affect on the seedlings height and diameter than the Ammonium Sulphate ($(NH_4)_2SO_4$) fertilizer. So the study suggested using the Calcium nitrate ($CaNO_3$) when you need to get the high diameter and seedlings height in the nursery. Meanwhile the Ammonium Sulphate ($(NH_4)_2SO_4$) have significant effect on the growth properties of the two tree species specially the dry weight of stem , root and the branches as well as the number of leaves.

For the salinity effect, the results indicated that, the salt concentration 5000 ppm was the most affective concentration on the seedlings growth at the two tree species. The seedlings tree felled to tolerant the concentration 5000 ppm of the mixed salts used in the study, but the tolerant of the other salt concentrations were varied on the growth properties at the tree species. Finely, the two nitrogen sources significantly increased the growth properties of the tree species growing under the salinity stress at 1000, 2000, 3000 and 4000 ppm as compared to control treatment (water only) in the field condition. The fertilizers effect has the same effect on the growth of the tree species. The salt concentrations were affecting significantly of the growth of the trees under the study and the most harmed concentration was 5000 ppm as compared with the other concentrations and the control treatment.

So the present study suggested using both the Calcium nitrate ($CaNO_3$) or Ammonium Sulphate $(NH_4)_2SO_4$ as the nitrogen source can improve the growth and the biomass of the seedlings trees in the nursery by making the trees able to tolerant the hazed conditions in the field as well as, increased the salinity tolerant found in the soil of Riyadh city.

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REFERENCES

Abdul Qados, A.M.S., 2011. Effect of salt stress on plant and metabolism of bean plant *Vicic faba*(L). J. Saudi Soc. Agricul. Sci., 10: 7-15.

Alshammarya, S.F., Y.L. Qian and S.J. Wallner, 2004. Growth response of four turfgrass species to salinity. Agricul. Water Manage., 66: 97-111.

Bargali, K. and S.P. Singh, 1993. Effect of nutrient application on leaf longevity in tree seedlings: An experimental trial. J. Trop. Forest Sci., 6: 323-331.

Berger, T.W. and G. Glatzel, 2001. Response of *Quercus petraea* seedlings to nitrogen fertilization. Forest Ecol. Manage., 149: 1-14.

Bouhmouch, I., B.S. Mouhsine and F. Brhada, 2005. Influence of host cultivars and *Rhizobium* species on the growth and symbiotic performance of *Phaseolus vulgaris* under salt stress. J. Plant Physiol., 162: 1103-1113.

Chartzoulakis, K. and G. Klapaki, 2000. Response of two greenhouse pepper hybrids to NaCl salinity during different growth stages. Sci. Hortic., 86: 247-260.

Chartzoulakis, K.S., 2005. Salinity and olive: Growth, salt tolerance photosynthesis and yield. Agricul. Water Manage., 78: 108-121.

Cordovilla, M.P., A. Ocana, F. Ligero and C. Lluch, 1995. Salinity effects of growth analysis and nutrient composition in four grain legumes-*Rhizobium* symbiosis. J. Plant. Nutr., 18: 1595-1609.

Dianda, M., J. Bayala, T. Diop, S.J. Quedraogo, 2009. Improving growth of shea butter tree (*Vitellaria paradoxa* C.F Gaertn.) seedlings using mineral N, P and Arbuscular Mycorrhizal (AM) fungi. Biotechnol. Agron. Soc. Environ., 13: 93-102.

El-Kohen, A. and M. Mousseau, 1994. Interaction effects of elevated CO_2 and mineral nutrition on growth and CO_2 exchange of sweet chestnut seedlings (*Castanea sativa*). Tee physiology, 14: 679-690.

Gbadamosi, A.E., 2006. Fertilizer response in seedlings of a medical plant-*Enantia chlorantha*. Trop. Subtrop. Agroecosyst., 6: 111-115.

Gebauer, J., K. El-Siddig, A.A. Salih and G. Ebert, 2004. *Tamarindus indica* L. plantlets are moderately salt tolerant when exposed to NaCl induced Salinity. Scientia Horticulturae, 103: 1-8.

Ghassemi, F., A.J. Jakeman and H.A. Nix, 1995. Salinization of Land and Water Resources: Human Causes, Extent, Management and Case Studies. UNS, Press, Sydney, Australia.

Gomez, K.A. and A.A. Gomez, 1984. Statistical Procedure for Agriculture Research. 2nd Edn., John Wiley and Sons Inc., New York, USA., pp: 680.

Greenway, H. and R. Munnus, 1980. Machanisms of salt tolerance in nonhalphytes. Ann. Rev. Plant Physiol., 31: 149-190.

Horst, G.L. and R.M. Taylor, 1983. Germination and initial growth of Kentucky bluegrass in soluble salts. Agron. J., 75: 679-681.

Hu, Y. and U. Schmidhalter, 2005. Drought and salinity: A comparison of their effects on mineral nutrition of plants. J. Plant Nutr. Soil Sci., 168: 541-549.

Imada, S., N. Yamanaka and S. Tamai, 2009. Effects of salinity on the growth, Na partitioning, and Na dynamics of a salt-tolerant tree, *Populus alba* L. J. Arid Environ., 73: 245-251.

Kao, W.Y., H.C. Tsai and T.T. Tsai, 2001. Effect of NaCl and nitrogen availability on growth and photosynthesis of seedlings of a Mangrove species, Kandelia Candel L. Druce. J. Plant Physiol., 158: 841-846.

Korenkov, D.A., 1976. Agrokhimiia Azotnykh Udobrenii. Nauka Puplishers, Moscow, pp: 39.

Ltaief, B., B. Sifi, M. Zaman-Allah, J. Drevon and L. Mokhtar, 2007. Effect of salinity on root-nodule conductance to the oxygen diffusion in the *Cicer arietinum*, *Mesorhizobium ciceri* symbiosis. J. Plant Physiol., 164: 1028-1036.

Oliet, J., R. Planelles, M.L. Segura, F. Artero and D.F. Jacobs, 2004. Mineral nutrition and growth of containerized *Pinus halepensis* seedling under controlled-release fertilizer. Scientia Horticulturae, 103: 113-129.

Oskarsson, H., A. Sigurgeirsson and K.R. Rasmussen, 2006. Survival, growth and nutrition of tree seedlings fertilized at planting on andisol soils in Iceland: six-year results. Forest Ecol. Manage., 299: 88-97.

Oskarsson, H. and S.J. Brynleyfsdottir, 2009. The interaction of fertilization in nursery and field on survival, growth and forest heaving of birch and spruce. Icel. Agric. Sci., 22: 59-68.

Osman, S.M., 2010. Effect of minerl and bio-NPK soil application on young Olive trees and foliar fertilization on leaf and shoot chemical composition. Res. J. Agricul. Biol. Sci., 6: 311-318.

Osman, S.M., M.A. khamis and A.M. Thorya, 2010. Effect of minerl and bio-NPK soil application on vegetative growth, flowering, fruiting and leaf chemical composition of young olive trees. Research J. Agricul. Biol. Sci., 6: 54-63.

Parida, A.K. and A.B. Das, 2005. Salt tolerance and salinity effects on plants: A review. Ecotoxicol. Environ. Saf., 60: 324-349.

Porra, R.J., W.A. Thompson and P.E. Kriedemann, 1989. Determination of extinction coefficients and simultaneous equarions for assaying chlorophylls a and b extracted with four different solvents: Verification of the concentration of chlorophyll standards by atomic absorotion spectroscopy. Biochim. Biophys. Acta, 975: 384-384.

Qian, Y.L., S.J. Wilhelm and K.B. Marcum, 2001. Comparative responses of two Kentucky bluegrass cultivars to salinity stress. Crop Sci., 41: 1895-1900.

Snedecor, G.W. and W.G. Cochran, 1980. Statistical Methods. 7th Edn., Iowa State University Press, Iowa, USA., ISBN-10: 0-81381560-6, Pages: 507.

Tabatabaei, S.J., 2006. Effects of salinity and N on the growth, photosynthesis and N status of olive (*Olea europaea* L.) trees. Sci. Hortic., 108: 432-438.

Tejera, N.A., R. Campos, J. Sanjuan and C. Lluch, 2004. Nitrogenase and antioxidant enzyme activities in *Phaseolus vulgaris* nodules formed by *Rhizobium tropici* isogenic strains with varying tolerance to salt stress. J. Plant Physiol., 161: 329-338.

Wang, Y. and N. Nii, 2000. Changes in chlorophyll, ribulose bisphosphate carboxylase-oxygenase, glycine betaine content, photosynthesis and transpiration in *Amaranthus tricolor* leaves during salt stress. J. Hortic. Sci. Biotechnol., 75: 623-627.

Youssef, H.G., 2001. Dynamic of ion transport for some nutritional elements in plant. Ph.D. Thesis. Faculty of Agriculture, Ain Shams University.