J. Agric. Sci. Mansoura Univ., 27 (7): 4909 - 4922, 2002

EFFECT OF DIFFERENT NITROGEN FERTILIZERS SOURCES ON ROOT NODULES FORMATION AND GROWTH OF *Acacia salig* NA LABILL SEEDLINGS IN SANDY SOIL.

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ABSTRACT

This study was conducted at the Horticulture nursery of Shark El- Bohairate in Esmailia Governorate during two successive seasons of 1999/2000 and 2000-2001.

Pots seedlings of *Acacia saligna* 3 months old were fertilized monthly at the first three months of planting with three different nitrogen sources namely: urea, ammonium sulphate and ammonium nitrate at three rates of 0.5 , 1.0 and 1.5 gm N for each / pot.

The obtained results showed that different nitrogen fertilizers specially at low level of 0.5 gm encouraged Rhizobium root nodules formation as atmospheric nitrogen N2 fixation and produced a big size and heavy fresh and dry weight of Rhizobium nodules more than unfertilized plants and as the application rate of nitrogen fertilizers increased to 1.5 gm N. nodules formation decreased. Adding ammonium sulphate as a nitrogen carrier at low level of 0.5 gm N. promoted much more nodules formation than both forms of urea or ammonium nitrate.

Nitrogen fertilizers sources enhanced all the vegetative growth parameters viz. height growth increment, stem diameter, fresh and dry weight of shoots than unfertilized. Ammonium sulphate application at rate of 1..0 gm N. resulted the best growth height ,stem diameter and fresh weight of shoots followed by the form of urea fertilizer and lastly coming ammonium nitrate , while ammonium nitrate produced the heaviest dry weight of shoots followed by ammonium sulphate. Increasing the levels of fertilizers to 1.5 gm N. reduced the growth. However it was rather than the control.

Ammonium sulphate fertilizer increased the ratio of fresh and dry weight of shoots more than the two others and the form of ammonium nitrate reduced it. Different rates of nitrogen application had no effected nearly on the ratio of fresh and dry weight of shoots.

Fertilizer efficiency of ammonium sulphate was greatly in fresh weight followed by urea then ammonium nitrate was the last, on the other hand ammonium nitrate efficiency surpassed in dry weight production followed by ammonium sulphate and lastly urea fertilizer. Chlorophyll a and b content in leaves did not affect due to different nitrogen fertilizers sources. However the seedlings fertilized had excessive values of chlorophyll a and b more than those unfertilized. Leave nitrogen content increased positively due to different rates of fertilizers application where as the application rate increased nitrogen content in leaves increased. Fertilized plants with ammonium sulphate at low level of 0.5 gm N. raised up the percentage of nitrogen in leave more than the others carrier of nitrogen fertilizers, it may be due to that roots of *Acacia saligna* formed Rhizobium nodules that fixed the atmospheric N2 more than the other fertilizers It can be concluded from this study that there was synergetic effect between Rhizobiumm formation and nitrogen fertilization in amending the suitable nitrogenous requirements for enhancing *Acacia saligna* growth specially in sandy soil

Therefore it can be recommended that ammonium sulphate as nitrogen fertilizer at rate of 0.5 or 1.o gm N. is suitable for *Acacia saligna* cultivated in sandy soil.

INTRODUCTION

Acacia saligna Fam. Mimosaceae as a leguminous small tree is one of the fast growing species and native to south western of Australia (NAS, 1980). It enriches the soil and serves as a pioneer tree. *Acacia saligna* trees are used as windbreaks, dune fixation, stabilization of road banks, anti erosion plantations and fodder for animals without any side effect specially in desert lands.

Strains of Rhizobium isolated from roots of *Acacia saligna* were found to be highly tolerant to salinity and drought resistance, the tree grows well in a wide range of soils and annual rainfall 250-300 mm. Few legumes trees such as *Acacia saligna* have been nodulation ability that fix atmospheric N_2 subsequently makes these trees to develop well in- impoverished soil for replenishment of levels of soil organic N.

The trees legumes can be inoculated with specific strains of Rhizobia which may not occurs naturally at sites where Lal and Khanna (1993) indicated that the inoculation of trees with specific strains of Rhizobium spp had a positive effect on tree biomass. Also Herrera *et al.*. (1993) cleared that inoculation of woody legumes with selected Rhizobia improved the plant height, survival and biomass development growth of nitrogen fixing trees increased with either inoculation with Rhizobiumm or fertilizers additions. However, the growth of inoculated trees was enhanced than that of depend on fertilizer N.

Soil acidity affects both plant growth and survival of Rhizobium and the functioning of the symbioses. Halliday and Somasgaran, 1982 on *Leucaena leucocephala* cleared that successful nodulation was not sufficient in the acid soil location. Nodules formation are influenced by supplemental application of N fertilizers where Domenach and Kurdli, 1989 reported that *Alnus incana* is capable in fixing N_2 by Frankia nodules formation in the presence of high soil N. On the other hand Sangina *et al.* (1992) reported that adding 40 kg N/ ha reduced biology nitrogen fixation (BNF) by 50 % and also Sougoufara *et al.* (1990)illustrated that the supressive effect of inorganic N on BNF has been shown in *Casuarina equesitifolia*. Sangina *et al.* 1992 cleared that N_2 fixation ranged from 56 to 74 % depending on provenances and nitrogen sources.

Increasing the dose of NPK fertilization to 3 gm /pot showed remarkable decrease in size, fresh and dry weight of nodules. Nitrogen fertilization is very necessary in the life cycle of plants, due to its role in promoting physiological processes and it plays an important role in plant growth Omran *et al.*, (1980) on *Cupressus sempervirens, Casuarina cunninghamiana* Evans, (1986) on oak, and El- Tantawy *et al.* (1994) on *Cupressus sempervirens*. All of them emphasized the importance of nitrogen fertilizers for plant growth. The response of plant growth to the fertilizers varied to the sources of nitrogen, this might be attributed to the volatilization of nitrogen and ammonia Claussen and Lenz, (1995).

This investigation was carried out to study the effect of different nitrogen fertilizers sources at different levels on root Rhizobium nodules formation and seedlings growth of *Acacia saligna* grown in sandy soil.

MATRIALS AND METHODS

This experiment was carried out during two successive seasons of 1999/2000 and 2000/2001 at the nursery of Horticulture of Shark El-Bohirate in Esmailia Governorate.

Uniform seedlings of *Acacia saligna* Labill at age of 3 months and 20cm in height were transplanted on May 1st, 1999 and 2000 into plastic pots (25 cm in diameter) filled with 5 kg sandy soil Seedlings were irrigated with Nile water for one month after transplanting, then fertilized monthly at the first three months of planting, on June 1st, 1999 and 2000 with three different nitrogen carrier sources namely; Ammonium nitrate 33.5% N., Ammonium sulfate 20.6% N. Urea 46% N at three levels of 0.5, 1.0 and 1.5 g N for each source as well as the control which received no fertilizer. The seedlings were irrigated periodically with Nile water and the soil moisture content was maintained at level of 65% of field capacity.

The following parameters were recorded after 10 months of fertilization treatments.

1-Numbers of formed nodules on roots resulting from each treatment were counted

2-Size (cm^3), and fresh and dry weight (gm) of formed nodules were determined.

3-Increments of growth height (cm) and stem diameter (cm) at above ground surface were measured.

4-Fresh and dry weight (gm) of shoots

5- Ratio of shoots (fresh / dry weight)

6-Fertilizers efficiency was determined according to the following formula.

$$\text{Fertilizer efficiency} = \frac{\text{Fresh or dry weight of treatment} - \text{weight of control}}{\text{Fertilizer rate}}$$

7-Chlorophylls a and b in leaves were determined according to the method mentioned by Saric *et al.* 1967

8- Nitrogen content in leaves was determined as percentage according to pregel (1945).

Split plot design experiment with four replicates, each included 36 seedlings was the layout where the main plot was the different nitrogen sources while the sub plot was the rates of fertilization. The data were analyzed statistically by using New L.S.D. test according to Steel and Torrie 1980.

RESULTS AND DISCUSSION

Nodules number

Data presented in Table (1) obviously cleared that in the first season root nodules formation in *Acacia saligna* seedlings were more affected by different sources of nitrogen in which ammonium sulphate fertilizer resulted in significantly the highest number of nodules 6.44 compared with the two others fertilizers, whereas urea fertilizer was the medium 5.44 then ammonium nitrate was the last in ranking 5.01 regan rdless the effect of

different levels of fertilization. Rates of fertilization influenced on nodulation ability where adding the fertilization at low level of 0.5 gm N. as associated with an increases of the nodules formation significantly than the high level of 1.0 or 1.5 gm N. Since the values were 7..08, 5.71 and 5.57 respectively. However the difference between the two last levels were insignificant. It means that the low levels of fertilizer encouraged the formation of nodules on roots. The interaction between source of nitrogen and the application rate was significant, meanwhile application of ammonium sulphate at level of 0.5 gm N. produces the superior values of nodules 8.29. The obtained results of the second season have taken the same trend of those obtained from the first one.

Size of nodules

Size of nodules also was effective with both source of fertilizers and rates of application. Ammonium sulphate and urea in the first season exceeded significantly the size of formed nodules in average values of 1.8 and 1.7 cm^3 more than ammonium nitrate 1.58 cm^3 and applying the fertilizer at low level of 0.5 gm produced the biggest of 1.83 cm^3 while the high level of 1.5 gm N. resulted the smallest size of 1.69cm^3. However the three levels of fertilization resulted in production of more nodules number as big size than unfertilized plants, also applying ammonium sulphate at level of 0.5 gm N induced the biggest size. These results were confirmed in the second one.

Fresh and dry weight of nodules

Both fresh and dry weight of formed nodules increased significantly to maximum values in both seasons due to the fertilization compared to unfertilized, specially ammonium sulphate as a carrier to N. which resulted significantly the heaviest fresh and dry weight of nodules 1.25 and 0.42 gm respectively. Adding the fertilizers at low levels of 0.5 gm N. produced the heaviest fresh and dry weight of nodules while the high level of 1.5 gm N. induced the lightest.. However it was rather than the control which gave the lowest values in fresh and dry weight of 0.78 and o.28 respectively. From the aforementioned it could be concluded that applying the fertilizers specially ammonium sulphate at low levels promoted nodules formation on *Acacia saligna* roots at big size and heavy fresh and dry weight, it may be due to that ammonium sulphated application resulted in creation favorable acidity condition in soil which promoted the formation of nodules in accordance with the finding of Hammad (2000) who reported that nodules formation depend on fertilization and 1.5 NPK/ pot caused the best nodulation for *Acacia saligna* in sandy soil .and the nodules had a big size and also he mentioned that increasing the dose of NPK fertilization to 3.0 gm /pot caused a remarkable decreases in size , fresh and dry weight of nodules in agreement with the herein obtained results. Singina *et al.* (1992) illustrated that N_2 fixation ranged from 56-74% depend on provenances and source of nitrogen. Sempavalan *et al.* (1995) found that *casuarina glauca* trees are well modulated in soils that are quite acidic pH_4 .

Table (1) Effect of different Nitrogen fertilizers resources on number of nodules, size, fresh and dry weight of nodules formed on roots of *Acacia saligna* seedlings in season of 1999/2000 and 2000/2001

Season of 1999/ 2000

Rate of fert. (mg)	Numbers of nodules					Size of nodules(cm)					Fresh weight of nodules(gm)					Dry weight of nodules(gm)				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	4.12	6.78	5.58	5.27	5.44	1.54	1.82	1.76	1.68	1.70	0.80	1.22	0.88	0.82	0.93	0.28	0.44	0.22	0.19	0.28
Ammonium sulp	4.19	8.29	6.38	6.88	6.44	1.42	2.04	1.92	1.80	1.80	0.76	1.65	1.40	1.20	1.25	0.26	0.58	0.48	0.36	0.42
Ammonium nitr.	4.14	6.18	5.16	4.55	5.01	1.50	1.63	1.59	1.58	1.58	0.78	1.06	0.76	0.76	0.84	0.29	0.36	0.25	0.22	0.28
Mean	4.16	7.08	5.71	5.57		1.49	1.83	1.76	1.69		0.78	1.31	1.01	0.93		0.28	0.46	0.32	0.26	

L.S .D at o.o5 for (A) = 0.42 0.16 0.12 0.10
L.S .D at o.o5 for (B) = 0.18 0.08 0.26 0.06
L.S .D. at 0.05 for (AxB) = 0.64 0.32 0.38 0.14

Season of 2000/ 2001

Rate of fert. (mg)	Numbers of nodules					Size of nodules(cm)					Fresh weight of nodules(gm)					Dry weight of nodules(gm)				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	3.88	7.18	6.14	5.38	5.65	1.44	1.94	1.80	1.70	1.72	0.76	1.30	0.92	0.78	0.94	0.24	0.46	0.28	0.22	0.30
Ammonium sulp	4.15	10.26	6.92	6.68	7.00	1.46	2.14	1.96	1.74	1.83	0.78	1.72	1.18	1.10	1.20	0.22	0.54	0.45	0.32	0.38
Ammonium nitr.	4.04	7.26	6 05	4.66	5.50	1.52	1.78	1.64	1.62	1.64	0.80	1.16	0.98	0.78	0.93	0.24	0.42	0.33	0.25	0.31
Mean	4.12	8.23	6.10	5.57		1.47	1.95	1.80	1.69		0.78	1.39	1.03	0.89		0.23	0.47	0.35	0.26	

L.S .D at o.o5 for (A) = 0.52 0.18 0.09 0.16
L.S .D. at 0.05 for (B) = 0.14 0.10 0.06 0.06
L.S .D. at 0.05 for (AxB) = 0.40 0.26 0.12 0.21

Nevertheless nodulation normally is most successful within the range of soil pH from 6-8 in accordance with the herein obtained results which cleared that adding ammonium sulphate promoted the nodulation on roots of *Acacia saligna.*

Nodules formation on roots of *Acacia saligna* which produce Rhizobium is beneficial in Nitrogen N_2 atmospheric fixation specially in sandy soil that suffer from nutrients reduction.

Effect of fertilization on growth parameters

Table (2) shows that different nitrogen sources at different rates of supplemental application were more effective on vegetative growth.

1-Height growth increment

Height growth in the first season increased to significantly maximum value due to the application of ammonium sulphate 99.18 followed by ammonium nitrate 87.2 cm then urea fertilizer produced the lowest height growth increment 82.72 regardless the effect of rates of application.

Adding the fertilizers at different levels affected on height growth where both of 0.5 and 1.0 gm N. gave significantly the highest value and as the level increased to 1.5gmN the height growth deceased. However it was better than unfertilized plants. It can be also noticed that using ammonium sulphate at rate of 1.0 gm N resulted the superior growth. The results of the second season were in the same line of the first one but the differences varied due to climatic changes.

Figure (1) Cleared the relative increment% of height growth attributed to the control , it can be concluded that ammonium sulphate fertilizer at rates of 0.5 , 1.0 and 1.5 gm N. increased the increment height growth by 62.69 and 35%, respectively, while ammonium nitrate increased it by 38, 25 and 4% then urea increased the height growth by 35, 12 and 7%

2- Stem diameter

The obtained results demonstrated that also in both seasons using ammonium sulphate gave the best values in stem diameters while those of urea and ammonium nitrate recorded the same values approximately. Stem diameter increased significantly to maximum due to rate of 1.0 gm N more than both of 0.5 and 1.5 gm. irrespective the effect of fertilizers sources However the combination between using ammonium sulphate and the rate of 1.5 produced the thickest stem, 1.46 and 1.48 cm in both seasons respectively in accordance with the findings of Ghazalia, (1995) who mentioned that nitrogen fertilizers up to 9 gm/p0t increased stem diameter of *Taxodium destichum* seedlings also Hala, (1999) on *Casuarina cunninghamiana* and *Casuarina glauca* indicated that the rate of 1 gm N. increased stem diameter. on the other hand Omer, *et al.* (1996) recommended that ammonium sulphate is suitable nitrogen fertilizer for *Silbum marianum*

Table (2) Effect of different nitrogen fertilizers resources on increment of height growth (cm), diameter stem (cm) fresh weight of shoots and roots of *Acacia saligna* seedlings in season of 1999/2000 and 2000/2001

Season of 1999/ 2000

Rate of fert. (mg)	Increment of height growth (cm)					Stem diameter (cm)					Fresh weight of shoots (gm)					fresh weight of roots (gm)				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	72.0	92.6	89.46	76.80	82.72	0.86	1.02	1.10	0.94	0.98	90.52	115.64	122.60	94.60	105.84	24.74	28.60	33.20	26.60	28.29
Ammonium sulp	70 0	113.46	118.52	94.74	99.18	0.82	14	1.34	1.46	1.19	86.40	128.50	148.20	135.40	124.62	22.60	30.45	40.16	34.20	31.85
Ammonium nitr.	74.0	96.45	92.64	85.71	87.20	0.80	0.92	1.14	0.98	0.96	84.64	96.20	106.44	99.80	96.77	26.40	38.40	46.21	36.78	36.95
Mean	72.0	100.84	100 21	85.75		0.83	1.03	1.19	1.13		87.19	113.45	125.75	109.93		24.58	32.48	39.86	32.52	
L.S .D at o.o5 for (A)			=	10.4					0.15					9.85						2.50
L.S .D. at 0.05 for (B)			=	8.68					0.11					7.64						3.74
L.S .D. at 0.05 for (AxB)			=	11.46					0.24					12.32						5.16

Season of 2000/ 2001

Rate of fert. (mg)	Increment of height growth (cm)					Stem diameter (cm)					Fresh weight of shoots (gm)					fresh weight of roots (gm)				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	76.82	103.74	86.21	82.59	87.34	0.84	0.98	1.14	0.86	0.96	82.68	100.52	116.50	88.40	97.03	25.60	28.64	30.50	28.72	28.37
Ammonium sulp	80 10	114.81	122.64	88.75	101.58	0.88	1.26	1.48	1.32	1.24	86.43	116.82	134.70	89.65	109.15	24.60	32.45	39.20	30.18	31.61
Ammonium nitr	78.40	108.40	98.74	82.14	91.92	0.76	0.90	1.24	1.00	0.98	88.74	94.48	99.20	92.62	96.62	24.20	36.60	41.82	32.20	34.96
Mean	78.44	108.98	102.53	84.49		0.83	1.05	1.29	1.06		85.95	103.94	116.80	93.22		24.80	32.56	37.17	30.37	
L.S .D at o.o5 for (A)			=	9.14					0.21					11.21						2.66
L.S .D. at 0.05 for (B)			=	10.05					0.16					9.85						3.05
L.S .D. at 0.05 for (AxB)			=	11.61					0.38					13.06						4.12

3- Fresh and dry weight of shoots

The fertilization with ammonium sulphate elucidated the heaviest fresh weight while ammonium nitrate exhibited the heaviest dry weigh followed by ammonium sulphate. Rate of fertilizers application of 1.0 gm. N. produced significantly the maximum values of fresh and dry weight compared with unfertilized plants and as the level of fertilization increased to 1.5 gm N. fresh and dry weight reduced. However it was better than unfertilized, it could be also observed that using ammonium sulphate at level of 1.0 gm N. gave the heaviest fresh weight while ammonium nitrate at level of 1.0 induced the heaviest dry weight.

From the above mentioned results , it could be concluded that ammonium sulphate fertilizer was preferable and using the low level of 0.5. or 1.0 gm N. were sufficient economically at least under this investigation condition than the high level of 1.5 gm N. in accordance with the finding of Fatma, *et al.* (1997) who reported that the heaviest fresh and dry weight was obtained by ammonium sulphate. Many investigators stated that the effect of nitrogen fertilizers on growth of plants varied according to the type of plant, carrier of N. and its used level, Cassaliccho *et al.* (1997) Farag and Kariem, (1990), Subramanian *et al.* (1993) and Badr *et al.* (1995).

Generally, it could be concluded that the positive increment N. on the plant growth may be due to its favorable effect Nitrogen encouraged the number of leaves and branches through its stmulative effect on the meristimatic activity of tissues. These effects differ according to the nitrogen carrier , those the herein study proved that the form of ammonium sulphate gave the best growth in *Acacia saligna* seedling followed by the form of ammonium nitrate, lastly urea, It means that nitrogen in the form of ammonium promoted more growth than urea. This might be attributed to the stimulated effect of ammonia on the plant photosynthetic apparatus, Lopez *et al.* (1994),and or due to the speedily release of urea to the deeper layers of soil, Claussen and Lenz (1995)

Ratio of shoots (fresh weight / dry weight)

As shown in Table (3) it is indicated that ratio increased to maximum value due to the fertilization with ammonium sulphate followed by urea while ammonium nitrate was the least in ranking, meaning that the ammonium nitrate increased the dry matter more than the two others. On the other hand the different rates of nitrogen fertilization did not effect on the ratio. However the combination between ammonium sulphate and the rate of 0.5 gm N. produced the highest ratio of 4.22.

Nitrogen fertilizers efficiency

As shown in Figure (2) Nitrogen fertilizers efficiency of fresh weight of shoot / plant was improved as a result to different nitrogen sources application . Ammonium sulphate application gave the highest mean values of fertilizer efficiency where every mg N applied produced 8.42, 6.18 and 3.26 gm fresh weight of shoots / plant fertilized at level of 0.5, 1.0 and 1.5 gm N. respectively, while ammonium nitrate produced the lowest values of nitrogen fertilizers efficiency since each mg N. gave 2.31, 2.18 and 1.01 gm fresh weight respectively, then urea fertilizer efficiency was the intermediate.

Table (3) Effect of different nitrogen fertilizers resources on fresh / dry weight of shoots ratio , chlorophyll a, and b, nitrogen % in leaves of Acacia saligna seedlings in season of 1999/2000 and 2000/2001

Season of 1999/2000

Rate of fert. (mg)	Fresh/ dry weight of shoot ratio					Chlorophyll a(mg/g fresh weight					Chlorophyll b(mg/g fresh weight					Nitrogen %				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	3.66	4.04	3.69	3.56	3.74	3.15	4.25	4.51	4.30	4.05	4.90	5.15	5.67	5.30	5.26	2.02	2.15	2.35	2.44	2.28
Ammonium sulp	3.82	4.22	3.69	3.96	3.92	3.15	3.60	3.85	3.72	3.58	4.90	5.05	5.45	5.28	5.17	2.02	3.32	2.88	2.92	2.79
Ammonium nitr.	3.21	2.51	2.30	2.71	2.68	3.15	3.66	4.25	4.05	3.78	4.90	5.18	4.62	5.26	5.24	2.02	2.28	2.48	2.56	2.34
Mean	3.56	3.59	3.23	3.41		3.15	3.84	4.20	4.02		4.90	5.13	5.58	5.28		2.02	3.26	2.57	2.64	

Season of 2000/ 2001

Rate of fert. (mg)	Fresh/ dry weight of shoot ratio					Chlorophyll a(mg/g fresh weight					Chlorophyll b(mg/g fresh weight					Nitrogen %				
Fertilizers	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M	0.0	0.5	1.0	1.5	M
Urea	3.00	4.08	4.09	3.89	3.77	3.22	4.08	4.55	4.45	4.08	4.77	5.12	3.60	5.44	5.23	2.14	2.34	2.48	2.56	2.38
Ammonium sulp	3.51	3.60	3.44	3.27	3.46	3.22	3.52	3.90	3.76	3.60	4.77	5.08	5.36	5.20	5.10	2.14	3.48	2.76	2.98	2.84
Ammonium nitr.	3.04	2.58	2.37	2.88	2.72	3.22	3.77	4.33	4.12	3.86	4.77	5.10	5.55	5.36	5.20	2.14	2.40	2.60	2.68	2.46
Mean	3.18	4.42	3.30	3.35		3.22	3.79	4.26	4.11		4.77	5.10	5..50	5.33		2.14	3.45	2.61	2.74	

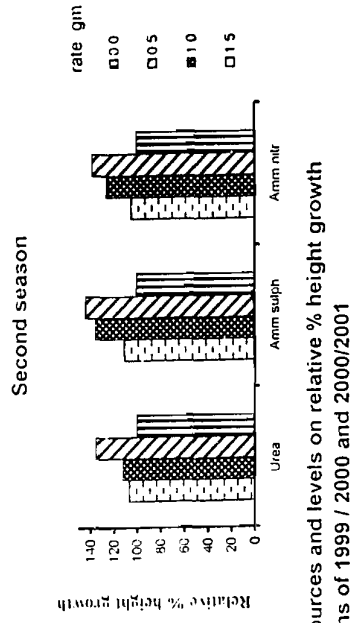

Fig (1) effect of different nitrogen fertilizer sources and levels on relative % height growth of Acacia saligna seedlings in seasons of 1999 / 2000 and 2000/2001

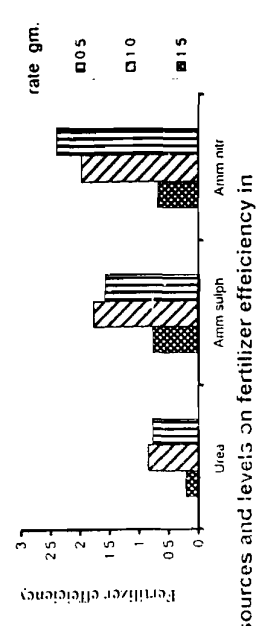

Fig (2) effect of different nitrogen fertilizer sources and levels on fertilizer effeiciency in seasons of 1999 / 2000 and 2000/2001

Ammonium nitrate had the highest values of nitrogen fertilizer efficiency in dry weight production in which each mg N. induced 2.4, 1.98 and 0 .69 gm dry weight of shoot / plant fertilized with 0.5, 1.0 and 1.5 gm N. respectively while ammonium sulphate was the medium in ranking, then urea had the lowest fertilization efficiency. These results were emphasized in both first and second season.

The former results were in harmony with those obtained by **El-Sherbiny** *et al.*(1997) where they reported that the highest mean values of fertilizer efficiency was found to be the highest with ammonium sulphate.

Chemical analysis

1-Nitrogen leave content

As shown in Table (3) it could be observed that nitrogen content in leave of fertilized plants increased over the unfertilized.

Fertilization with nitrogen fertilizer as form of ammonium sulphate resulted in a noticeable increase in nitrogen leave content more than urea and ammonium nitrate and as the rate of application of nitrogen fertilizer exceeded a slight excessive in nitrogen leave content was occurred. one, this fact exhibited in both seasons It could be also concluded from Table(3) that application of ammonium sulphate at level of 0.5 gm N. increased leave N. content to maximum value of 3.32%, it may be due to that the low level of ammonium sulphate promoted Rhizobium nodulation on roots of *Acacia saligna* consequently associated in atmospheric nitrogen N_2 fixation. The previous results were in harmony with those obtained by El- Tantawy *et al.* (1994) on *cupressus sempervirens*, Shehata and Darwiesh(1998) on some *pinus species*. All of them coincided with the herein obtained results

2-Total chlorophylls

Total chlorophyll a and b in leaves was considerably effected in two seasons due to the fertilization by different nitrogen sources where chlorophyll a raised up in the leave plants fertilized by urea to maximum value of 4.05 followed by ammonium nitrate 3.78 while the leaves of plants fertilized by ammonium sulphate had the least values 3.58 .The rate of fertilization also was effective since rate of 1.0 gm N resulted the highest value of chlorophyll a in average value of 4.2 mg/g fresh weight followed by the rate of 1.5 gm which gave the value of 4.02 mg/gm fresh weight then the rate of 0.5 gm N was the least one; However all the three used levels of fertilization recorded an increases in chlorophyll a than unfertilized .The plants fertilized with urea combined with 1.0 gm N gave the best value in chlorophyll a that gave mean value of 4.51 mg/g fresh weight. Chlorophyll b tended to be similar to those obtained in chlorophyll a but the values differed where they were more than of chlorophyll a.

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27 (7) 2002

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تأثير التسميد الآزوتي بمصادر مختلفة على تكوين العقد الجذرية البكتيرية ونمو شتلات الأكاسيا ساليجنا في التربة الرملية.

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أجريت هذه الدراسة فى مشتل البساتين بشرق البحيرات فى الإسماعيلية خلال موسمين ناجحين ١٩٩٩ – ٢٠٠٠ ، ٢٠٠٠ – ٢٠٠١ حيث سمدت شتلات الأكاسياساليجنا بعمر ثلاثة شهور شهريا ولمدة الثلاث شهور الأولى من تاريخ الزراعة بثلاث مصادر مختلفة من التسميد الآزوتي وهى :–

اليوريا – سلفات النشادر – نترات النشادر وذلك بمعدلات ٠,٥ ، ١ ، ١,٥ جم آزوت لكل أصيص وأوضحت النتائج ما يلي :–

- أدى التسميد الآزوتي خاصة بالمعدلات المنخفضة ٠,٥ جم أزوت إلى تشجيع تكوين العقد الجذرية البكتيرية كمثبتات للأزوت الجوى بأحجام وأوزان أكبر في تلك النباتات عن النباتات التي لم تسمد.
- نقص تكوين العقد الجذرية مع زيادة معدل إضافة السماد الآزوتي إلى ١,٥ جم أزوت.
- إضافة سماد سلفات النشادر كحامل للأزوت بمعدل منخفض ٠,٥ جم أزوت أدت إلى تنشيط تكوين العقد الجذرية أكثر من استخدام سماد اليوريا أو نترات النشادر.
- أدى التسميد الآزوتي على تحسين كل عناصر النمو (الزيادة في النمو الطولي – قطر الساق – الوزن الطازج والجاف للفروع) أكثر من النباتات التي لم تسمد.
- التسميد بسلفات النشادر بمعدل ١ جم أزوت أعطى أعلى نمو طولي وزيادة في قطر الساق والوزن الطازج للأفرع يليه في ذلك التسميد باليوريا بينما التسميد بنترات النشادر أعطى اقل القيم ولكنه أعطى أعلى القيم في الوزن الجاف للفروع يليه في ذلك التسميد بسلفات النشادر.
- زاد النمو مع زيادة معدل التسميد الآزوتي حتى ١ جم آزوت و بزيادة المعدل حتى ١,٥ جم أدى إلى نقص في النمو ومع ذلك كان افضل من النباتات التي لم تسمد.
- أدى التسميد بسلفات النشادر إلى زيادة النسبة بين الوزن الطازج والجاف للأفرع اكثر من التسميد بالأسمدة الآزوتية الأخرى والتسميد بنترات النشادر قد أعطى اقل نسبة ولم تؤثر إضافة الأسمدة بالمعدلات المختلفة على النسبة بين الوزن الطازج والجاف للأفرع.
- كانت الكفاءة التسميدية لسلفات النشادر في إنتاج الوزن الطازج للفروع أعلى يليه في ذلك سماد اليوريا ثم أخيرا سماد نترات النشادر في حين كان سماد نترات النشادر أعلى كفاءة سمادية في إنتاج الوزن الجاف للأفرع ثم سماد سلفات النشادر ثم اليوريا.
- لم يتأثر محتوى الأوراق من الكلورو فيل نتيجة التسميد الآزوتي بالمصادر المختلفة وزاد الكلوروفيل في النباتات المسمدة عن الغير مسمدة وأيضا ذادت مع زيادة معدل إضافة السماد.
- زاد محتوى الأوراق من الآزوت مع التسميد الآزوتي وكذلك مع زيادة معدل الإضافة عن النباتات الغير مسمدة.
- أدى التسميد بسلفات النشادر بمعدل ٠,٥ جم أزوت إلى زيادة النيتروجين في الأوراق عن السماد ين الآخرين ويرجع ذلك إلى كثرة تكوين العقد الجذرية البكتيرية المثبتة للأزوت الجوى.

نستنتج من هذه الدراسة وجود تأثير تعاوني بين تكوين العقد البكتيرية والتسميد الآزوتي المستخدم في تعويض نقص الاحتياجات النيتروجينية المناسبة لتحسين نمو الأكاسيا ساليجنا خاصة فى الأراضي الرملية، وبناء على ذلك فيمكن التوصية بتسميد شتلا ت الاكاسيا ساليجنا المزروعة في الأرض الرملية بسماد سلفات النشار بمعدلات ٠,٥ جم أو ١ جم كمعدلات اقتصادية.