EFFECT OF SOME BIO AND CHEMICAL FERTILIZERS ON GROWTH AND CHEMICAL COMPOSITION OF *Pinus halepensis*, MIL L. SEEDLINGS

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Abstract

An attendance study was approved to conclude the influence of different fertilization types and levels to increment *Pinus halepensis* seedling quality and enhance growth rats under nursery conditions. Seedlings of pinus (one-year-old cultivated on 14 cm black polyethylene bag filled with a mixture of sand, loam 1:1,v./v.) were carried out during two successive seasons (2011 and 2012) at the nursery of Timber Trees and Forestry Res. Dept., Hort. Res. Inst., Giza, Egypt. In derail, organic fertilizers "Biogien" (3.00–6.00 g/bag) and "Rhizobacterien" (3.00–6.00 g/bag) as bio-fertilizer addition to mineral "NPK" (1:1:1) at stages of (1.00 , 2.00 and 4.00 g/bag) and "Vive Rose" as a foliar spray (1.00–2.00 g/l) were used in derail. Fertilizer applications were used to investigate the effects on growth parameters and the chemical composition of *P. halepensis*. The data revealed seedlings treated with "Biogien" at 6.00 g/seedling had the best significant seedling quality (SQ) and chemical composition during two seasons. In this view, "Vive Rose" as a foliar application at (2.00 g/l) had a significant increment in stem height, stem diameter, branch number, root length, fresh and dry weights of aerial parts (stems and leaves), fresh and dry weights of roots, the relative growth rate of height (RGRH), the relative growth rate of length (RGRD), total dry biomass percentage, and nutrient uptake compared to control. In the meantime, "Rhizobacterien" at 6.00g/sedling significantly enhanced root length and leaf content of chlorophyll b, carotenoids, N, and K percentage compared to mineral fertilizer. Using "Biogien" at 6.00 g/bag for pine seedlings recorded the strongest seedlings, as well as reduced time in the nursery to minimize seedling production costs and improve our environment.

Keywords: Bio-fertilizer "Biogien" –" Rhizobacterien" – Foliar-fertilizer "Vive Rose" – NPK- Fertilization - Vegetative growth -Chemical composition - *Pinus halepensis* L.

INTRODUCTION

Pinus halepensis, Mill. (*P. alepensis*, Poir.) Fam. Pinaceae, normally recognized as, The Aleppo Pine, is a pine resident of the Mediterranean area. *P. halepensis* is a intermediate tree, over than 15.00 m in height, with stem diameter up to 60.00 cm. The bark is nearly orange-reddish, thick fissured at bottom of the trunk's tree furthermore slim and flaky in the top crown. The leaves are needles shape and slender, 6–12 cm in length, definitely yellowish-green, and pairs. The cones are thin conical, up 5.00 cm tall and over 2.00 cm wide at the bottom while closed, green at primary, maturing shiny almost reddish-brown after 24 months. They open gradually after a few years, a development almost rapidly if it showed then to thermal such as the forest's fires. The cones immediately open to discharge the seeds to separate. The seeds length are nearly 0.50 cm, with a 2.00 cm wing, and are air-dispersed. Bailey, (1976).

Pine trees have a significant impact on the economy in timber prices, pulp manufacturing, watershed management, fuel, and amenities. Fady, (2012). Trees have a very significant role in the economy and natural science. Barbero *et al.,* (1998), it has used soil protection and windbreaks to enhance water penetration on mountainous slopes and to avoid soil erosion on slopes Farjon, (2010). Seeds of *P. halepensis* are made into pastry in North Africa Maestre and Cortina, (2004).

The studies in this side suggest that growth of root promotion is manipulated by growth environmental and that IAA applications and root respiration rates are two composition mechanisms connected with rhizobacteria activity and root promotion. Barriuso, *et al.* (2008) this study observed that the possible of PGPR due to increment strength of forest trees. Furthermore, the definitely among the mycorrhiza addition to the bacteria inoculated that the seedling choices engage a possible biotechnological manufacture of value-added fungi of *P. pinea*. Bio-fertilization is a popular method of fertilizing seedlings. *Azotobacter chroococcum* plays a key role in nitrogen cycle fixation, producing vitamins such as thiamine and riboflavin, Revillas *et al.,* (2000) as well as plant hormones such as IAA, GA, and cytokinins Van Loon, (2007). Bhattacharyya, (2012) obligated that *Azospirillum brasilense* had a novel nitrogen-fixing bacteria that promote several aspects of seedling development. Enebak *et al.* (1998) found that applying plant growth promoting rhizobacteria (PGPR) to *Pinus taeda* seedlings reduced damping-off and incremented growth. Inoculation using *Bacillus megaterium*, which is a phosphorus dissolvent, enhances phosphate accessibility in the root rhizosphere Rodriguez and Fraga, (1999). Bacteria such as *Pseudomonas spp*., *Bacillus spp., Azotobacter spp*., and *Azospirillum spp*. Saharan and Nehra, (2011). When *P. pinea* seedlings are inoculated with PGPR, the seedlings develop faster. All criteria were shown to be improved when bio-fertilizer types were used Probanza *et al*., (2002) , Ramos *et al.,* (2006) and Jaiti, (2007). The use of diverse bio-fertilizers that are more capable than N, P, and K in plant contents Wu et al., (2005), as well as the content of chlorophyll a, b, carotenoids, and carbohydrates Wu *et al*., (2005). Watfa, (2009). Dominguez, *et al.,* (2012) found that several rhizobacteria were competent to instrument an organization moreover performance of ecto-mycorrhiza symbiosis. In this survey, trees of *P. halepensis* were immediately inoculated by the mycorrhiza *Tuber melanosporum* plus the rhizobacteria. A previous five months nearly later from inoculation, we assessed the growth parameters of seedling, mycorrhiza colonies applications, elements absorption plus elements contents (Ca, N, P, K, Fe and Mg) in roots and aerial parts of the seedlings. Consequently, experiments designed to estimate the growth of root potentials. None of the processes changed the parameters of water or the root's growth potentials. The inoculations enhanced the growth and element absorbent of the root seedlings, while the combination of pine and mycorrhiza rarely led to a significant enhancement over the encouraging effects of an uncomplicated inoculation of mycorrhiza though the adding of pine performed twice the rate of the mycorrhiza. These effects might promise improvement in the cultivation of truffles.

There for lately farmers favored using the bio-fertilizers to save the environment. So this examination aims to establish the best type and suitable amount of some bio-fertilizer types "Biogien" or " Rizobacterien" or chemical fertilization (NPK "as soil drench" and Vive Rose as a foliar spray) to recognize the high quality growth of *P. halepensis* seedlings.

MATERIALS AND METHODS

At the open field in the Woody Trees and Forestry Nursery of the Experimental Farm of Hort. Res. Inst., Giza, Egypt during the 2011 and 2012 seasons, this investigation was performed to study the effects of either bio-fertilizer "Biogien" or "Rizobacterien" or "chemical fertilization" (NPK "as soil drench" and "Vive Rose" as a foliar spray) at various rates on the growth and chemical composition of *P. halepensis* seedlings. One-year-old transplants of *P. halepensis* are growing in 14 cm black polyethylene bags "one plant per bag" filled with about 700 g of an equal mixture of sand and loam (1:1 by volume). The physical and chemical properties of the used sand and loam soil are shown in Table (a), which were analyzed according to A.O.A.C. (1990).

Table a. Some physical and chemical properties of the used mixture in the two seasons (2011and 2012).

Season	Particles size distribution (%)						E.C. (dS/m)	pH	Cations (meq/L)			
	Coarse sand	Fine Sand	Silt	Clay	Organic Matter	$CaCO_3$			Ca^{++}	Mg^{++}	Na^{+}	K^{+}
2011	15.2	25.5	18.4	36.4	1.70	2.80	2.99	7.58	7.55	2.34	10.90	0.75
2012	15.3	24.7	17.8	38.0	1.50	2.70	2.78	7.50	10.33	1.56	8.67	0.75

Season	Anions (meq/L)			Macro-and micro-elements (ppm)						
	HCO_3^-	Cl^-	SO_4^{--}	N	P	K	Fe	Zn	Mn	Cu
2011	3.94	8.64	8.96	164.20	17.01	370.50	12.00	3.70	7.62	8.76
2012	4.08	7.96	9.27	173.16	15.78	361.76	15.80	4.36	8.03	8.80

Fertilizer treatment composition:

1- Biofertilizer as follows:

a- "Biogien", a commercial product containing a specific clone of *Azotobacter chroococcum* bacteria, conc.10^6 cells/ml.

b- "Rhizobacterien", a commercial product containing a specific clone of *Rhizobium sp*. bacteria, conc. 10^7- 10^8 cells/ml.

2- A mixture of chemical fertilization NPK (1:1:1) was added as soil drench (at the levels of 1.00, 2.00 g/bags). Fertilizers were used for ammonium sulphate (20.5%N), calcium super phosphate (15.5% P_2O_5), and potassium sulphate (48.5% K_2O).

3- Liquid fertilizer Tab. (b) clears the content of "Vive Rose" fertilizer according to the company's produced "UAD" union for Agric. development w/w. was sprayed on the foliage till run-off at the levels of 1.00 and 2.00 g/l. of water.

Table b. The content's of "Vive Rose" fertilizer

N%	P% "P_2O_5"	K% " K_2O"	Fe%	Zn%	Mn%	Cu%	Mg %	Ml%	Citric acid%	sucrose%
22.00	5.00	11.00	0.05	0.07	0.24	0.05	0.3	0.5	0.002	0.07

All seedlings under the various treatments received the usual agricultural practices such as weeding, etc. whenever needed. Data was also collected at the end of each season. The first season began on 1/3/2010 and ended 1/5/2011. Treatments for the second season, which began on 1/3/2011 and ended 1/5/2012, treatments as follows:

1- Seedlings without treatment as control.
2- Individuals treated with "Biogien" 2.00 g/seedling at (1stMarch, 1stApril, and 1stMay) for 6.00 g/seedling during season.
3- Individuals treated with "Biogien" 1.00 g/seedling at (1stMarch, 1stApril, and 1stMay) for 3.00 g/seedling during season.
4- Individuals treated with "Rhizobacterien" 2.00 g/seedling at (1stMarch, 1stApril, and 1stMay) for 6.00 g/seedling during season.
5- Individuals treated with "Rhizobacterien" 1.00 g/seedling at (1stMarch, 1stApril, and 1stMay) for 3.00 g/seedling during season.
6- Individuals treated with "Vive Rose" as a foliar spray 0.66 g/l at (1stMarch, 1stApril, and 1stMay) for 2.00 g/l during season.
7- Individuals treated with "Vive Rose" as a foliar spray 0.33 g/l at (1stMarch, 1stApril, and 1stMay) for 1.00 g/l during season.
8- Individuals treated with "NPK" g/seedling 1.33 g/seedling at (1stMarch, 1stApril, and 1stMay) for 4.00 g/seedling during season.
9- Individuals treated with "NPK" g/seedling 0.66 g/seedling at (1stMarch, 1stApril, and 1stMay) for 2.00 g/seedling during season.
10- Individuals treated with "NPK" g/seedling 0.33 g/seedling at (1stMarch, 1stApril, and 1stMay) for 1.00 g/seedling during season.

Seedlings growth parameters:

seedling height (cm), stem diameter at soil surface (cm), number of branches/plant, root length/plant (cm), fresh and dry weights of aerial parts (stems and leaves), fresh and dry weights of roots (g)Survival % , (SQ) (Equation 1) was assessed based on Thompson (1985). The relative growth rates of height (RGRH, mm cm_1 d_1) and relative growth rate of diameter, (RGRD, μm mm_1 d_1) were calculated by using equations 2and 3 from 1st Feb. to 1st May according to Ostos *et al.* (2008).

SQ=H (plant height) / D (stem diameter) **[1]**
RGRH=Ln H2-Ln H1 /t2-t1 **[2]**
RGRD=Ln D2-Ln D1/t2-t1 **[3]**

Where H2 and H1 are the height of seedlings (cm) in the previous and primary measurements, respectively, D2 and D1 stem diameter (mm) in the last and first measurements, respectively, t2–t1 (days) are the last and first sampling dates, respectively, and Ln is the natural logarithm.

The seedling quality index (QI) Dickson *et al.,* (1960), total dry biomass increment percent (Dhindwal *et al.,* 1991,; Iqbal *et al.,* 2007), and nutrient uptake (g/seedling) Jackson, (1973) were calculated using formulas 4-5 and 6a, respectively.

The seedling quality index (QI)= Total seedling dry weight(g) /height (cm)/diameter(mm)+shoot dry weight(g)/root dry weight(g) [4]

Total dry biomass increment (%) =Total dry weight of the treatment - Total dry weight of the control treatment / dry weight of the control treatment*100 **[5]**

Nutrient uptake (g/seedling) = Nutrient content (%)* dry matter (g) /100 **[6]**

seedling chemical analysis:

- In fresh leaf samples taken from the middle parts of the plants, photosynthetic pigments (chlorophyll a, b, and carotenoids, mg/g F.W.) were determined according to Moran (1982).
- Total indoles and total soluble phenols were determined colourimetrically by using Folin Ciocaltea reagent A.O.A.C.(1990).
- In dry aerial parts, the percentages of nitrogen using the micro-Kjeldahle method described by Jackson,(1973), phosphorus, colorimetrically as indicated by Cottenie, *et al*. (1982) and potassium using the Flamephotometer set by Jackson,(1973) were measured.

Experimental design and statistical analysis:

The layout of the experiment in the two seasons were a randomized complete block design (RCBD) with three replicates Mead *et al.*, (1993), as each replicate consisted of nine seedlings.

The data was then tabulated and subjected to an analysis of variance using the SPSS Program Levesque, (2007), with Duncan's Multiple Range Test (1955) used to confirm the significance level among means of various treatments.

RESULTS AND DISCUSSION

Growth characters:

The growth parameters as affected by bio and chemical fertilization treatments are shown in Tab. (1). It was generally noticed that the best means of seedling height and diameter of stem registered significant increments by fertilizing with "Biogien" at the rate of 6.00 g/bag or sprayed with "Vive Rose" at 2.00 g/l. While "Biogien" at 3.00 g/bag gave a higher mean number of branches per seedling in the second season compared to control, The root length/seedling was significantly increased with "Rhizobacterien" at the rate of 6.00 g/bag and NPK at 4.00 g/bag (14.34 cm and 11.34 cm) as compared to the untreated seedling (11.00 cm).

The data indicated that in Tab. (2), the highest means of fresh and dry weights of aerial parts and survival percentage were recorded due to the application of "Biogien" at 6.00 g/bag bio-fertilizer addition to "Vive Rose" 2.00 g/l in both seasons. On the other hand, fresh and dry roots were significantly increased in seedlings when treated with "Biogien" bio-fertilizer at 3.00 g/bag or "Rhizobacterien" 6.00 g/bag treatments for the two seasons.

The analyses of variance presented in (Figs. 1, 2, 3, 4 & 5) showed the effects of different types and doses of bio and chemical fertilization treatments on seedling height/ stem diameter, the relative growth rate of height (RGRH) , the relative growth rate of diameter (RGRD), the seedling quality index (QI) and the total dry biomass increment percentage of *P. halepensis*. Untreated seedlings (control) showed a significant decrease (SQ) compared with other treatments. The higher dose of "Biogien" at 6.00 g/bag induced capable significant increases in seedling quality index (QI) in both seasons.

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Meanwhile, the relative growth rates of height (RGRH), (RGRD) and total dry biomass increment percentage were greatest in pine seedlings fertilized with "Vive Rose" at 2.00 g/l, followed by "Rhizobacterien" at 6.00 g/seedling for the first and second seasons in comparison with the untreated seedlings and all remaining treatments.

Data indicated that " Biogein" which contained *Azotobacter sp.,* It had the highest vegetative growth rate when compared to the other treatments. According to Gad (2001), *Azotobacter chroocooum* was capable of N fixation in addition to available phosphorus dissolving and growth promoting gibberellins produced by organisms.

Table 1. Effect of fertilization treatments on some vegetative growth parameters of *P. halepensis* seedlings during 2011 and 2012 seasons.

Treatments	seedling height (cm)	Stem diameter (cm)	No. of Branches/ Seedling	Root length / seedling (cm)
	First season: 2011			
Control	8.34 J	0.11 H	2.00 D	9.00 I
Biogien 3.00g/bag	25.34 DE	0.23 D	2.00 D	12.00 DE
Biogien 6.00g/bag	45.67A	0.34 A	3.34 A	15.34 A
Rhizobacterien 3.00 g/Bag	22.67 F	0.20 E	2.00 D	11.00 F
Rhizobacterien 6.00g/bag	35.67 C	0.27 C	2.34 C	13.00 C
Vive Rose 1.00 g/l	27.34 D	0.23 D	2.00 D	12.34 D
Vive Rose 2.00 g/l	40.00 B	0.31 B	3.00 B	13.67 B
NPK 1.00 g/bag	15.00 I	0.17 G	2.00 D	10.67 G
NPK 2.00 g/bag	20.34 GH	0.20 EF	2.00 D	10.67 G
NPK 4.00 g/bag	21.00 FG	0.21 E	2.00 D	10.34 GH
	Second season :2012			
Control	9.67 J	0.21 H	2.00 D	11.00 J
Biogien 3.00 g/bag	28.00 DE	0.45 D	2.00 D	13.34 DE
Biogien 6.00 g/bag	47.00 A	0.61 A	3.34 A	18.34 A
Rhizobacterien3.00 g/bag	23.00 F	0.43 E	2.00 D	12.67 F
Rhizobacterien6.00 g/bag	36.67 C	0.54 C	2.34 C	14.34 C
Vive Rose 1.00 g/l	29.34 D	0.50 D	2.00 D	13.67 D
Vive Rose 2.00 g/l	43.34 B	0.56 B	3.00 B	16.84 B
NPK 1.00 g/bag	17.67 I	0.40 G	2.00 D	12.00 G
NPK 2.00 g/bag	20.47 GH	0.42 EF	2.00 D	11.67 GH
NPK 4.00 g/bag	22.00 G	0.43 E	2.00 D	11.34 HI

Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test (DMRT) at 5% level.

Table 2. Effect of fertilization treatments on fresh and dry weights of different parts of *P. halepensis* seedlings during 2011 and 2012 seasons.

Treatments	Aerial parts F.W. (g)	Aerial parts D.W. (g)	Roots F.W. (g)	Roots D.W. (g)	Survival %
	First season: 2011				
Control	3.77 J	0.93 J	0.22 J	0.19 J	100
Biogien 3.00 g/bag	15.97 E	5.67 E	3.25 E	1.19 E	100
Biogien 6.00 g/bag	22.82 A	10.41 A	7.22 A	4.17A	100
Rhizobacterien3.00 /bag	14.79 F	4.68 F	2.25 F	1.15 F	100
Rhizobacterien6.00 g/bag	19.77 C	7.69 C	4.14 C	2.09 C	100
Vive Rose 1.00 g/l	19.57 CD	7.31 D	4.11 CD	2.06 CD	100
Vive Rose 2.00 g/l	20.57 B	9.31 B	7.13 B	5.11 B	100
NPK 1.00 g/bag	7.70 I	1.34 I	0.45 I	0.21 I	100
NPK 2.00 g/bag	10.92 H	2.68 H	0.94 H	0.36 H	100
NPK 4.00 g/bag	13.00 G	3.00 G	1.00 G	0.50 G	100
	Second season :2012				
Control	5.81 J	3.61 J	1.13 J	0.24 J	100
Biogien 3.00 g/bag	17.39 E	8.96 E	3.39 E	1.54 E	100
Biogien 6.00 g/bag	25.02 A	13.85 A	8.22 A	5.12 A	100
Rhizobacterien3.00 g/bag	15.06 F	7.84 F	2.34 F	1.18 F	100
Rhizobacterien6.00 g/bag	20.80 C	10.95 C	6.56 C	2.93 C	100
Vive Rose 1.00 g/l	19.61 CD	9.37CD	4.14 CD	2.88 CD	100
Vive Rose 2.00 g/l	23.66 B	12.34 B	7.16 B	4.13 B	100
NPK 1.00 g/bag	9.75 I	5.35 I	0.89 I	0.39 I	100
NPK 2.00 g/bag	10.12 H	6.99 H	1.29 H	0.17 H	100
NPK 4.00 g/bag	12.00 G	7.52 G	1.93 G	0.54 G	100

Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test (DMRT) at 5% level.

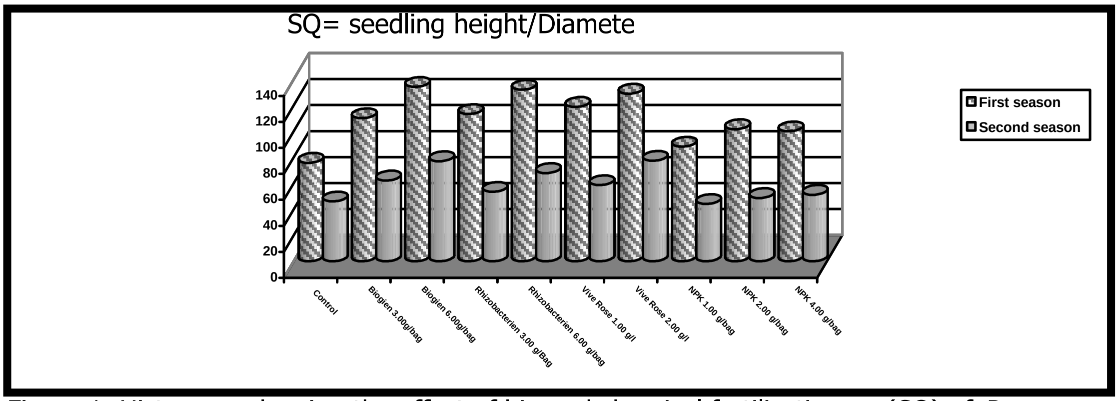


Figure 1. Histogram showing the effect of bio and chemical fertilization on (SQ) of *P. halepensis.*

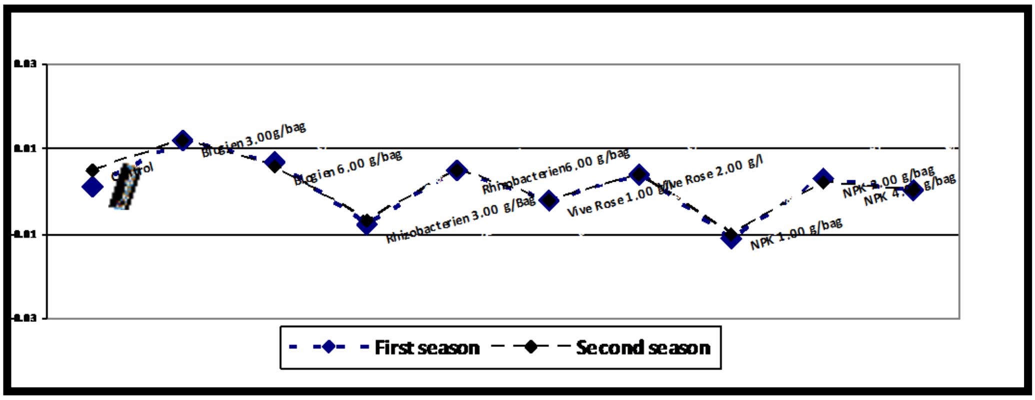


Figure 2. Histogram showing the effect of bio and chemical fertilization on the relative growth rate of height (RGRH) of *P. halepensis*.

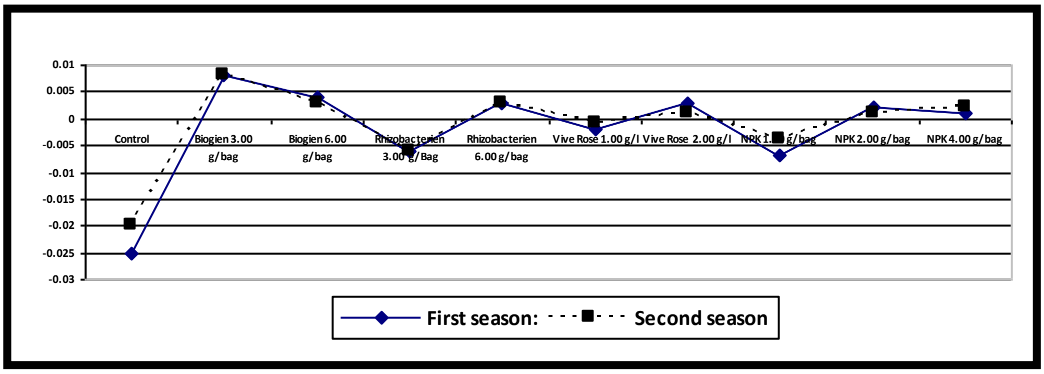


Figure 3. Histogram showing the effect of bio and chemical fertilization on the relative growth rate of diameter (RGRD) of *P. halepensis*.

The seedlings quality index (QI)

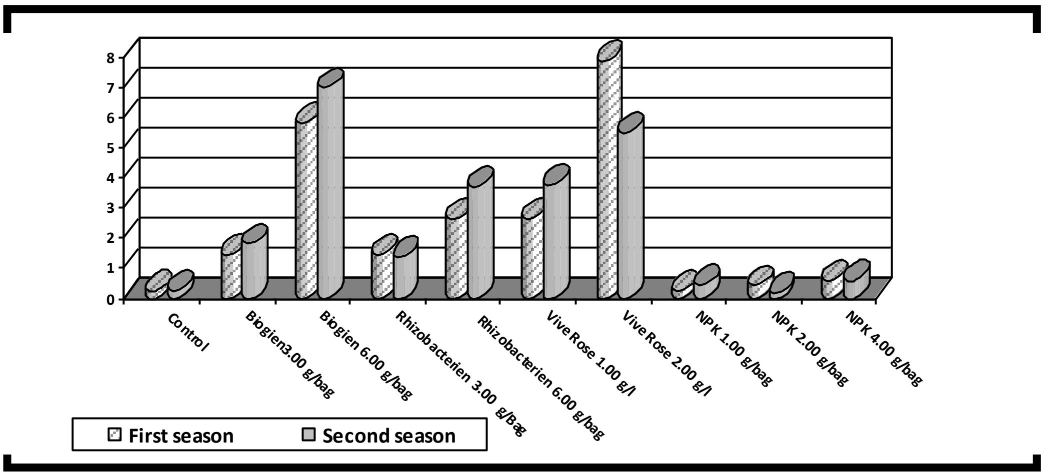


Figure 4. Histogram showing the effect of bio and chemical fertilization on the seedlings quality index (QI) of *P. halepensis.*

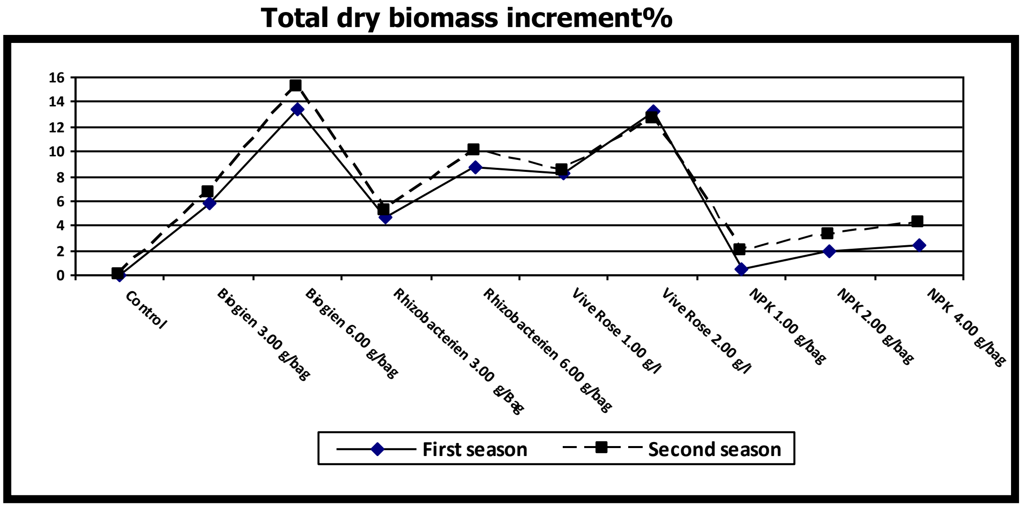


Figure 5 . Histogram showing the effect of bio and chemical fertilization on total dry biomass% of *P. halepensis.*

Chemical composition:

Photosynthetic Pigments:

The highest increases in chlorophyll (a) leaf contents were recorded from seedlings fertilized with "Biogien" at 6.00 g/bag and "Vive Rose" at 2.00 g/l, for the latter (1.55 and 1.14 mg/g F.W.) respectively, compared to 0.09 (mg/g F.W.) for the control. Meanwhile, treating seedlings with "Rhizobacterien" at 6.00 g/bag significantly elevated chlorophyll (b) and caroteniod content in the leaves of pine seedlings compared with control and other treatments. According Tab. (3), mean level of total chlorophyll contents were a significant increment obtained at the dose of NPK 1.00 g/bag 0.15 (mg/g F.W.) compared to control 0.09 (mg/g F.W.).

According to Tab. (4), it was found that the highest increments in leaf content of N and P were obtained from seedlings fertilized with "Vive Rose" (2.00 g/l). Meanwhile, the highest value of leaf content of K was induced in seedlings fertilized with "Biogien" 6.00 g/bag. Data collected reveals few differences in leaf content of total indoles and phenols between all treatments.

These results came in response to the role of N in chlorophyll and amino acid synthesis, and P which contributes to regulating the opening and closing of stomata and possibly membrane turgor that affects chlorophyll formation through its radioactive properties. Phosphorus would activate various metabolic processes, and it is involved in energy transfer processes during the building of phospholipids and nucleic acids. Marschner, (1995). Moreover, P is essential for the biosynthesis of nucleic acids, phospholipids, coenzymes and ATP, which all affect photosynthesis, protein formation, and N_2 fixation Buchanan, *et al.*, (2000). As such, seedling development increases when P addition.

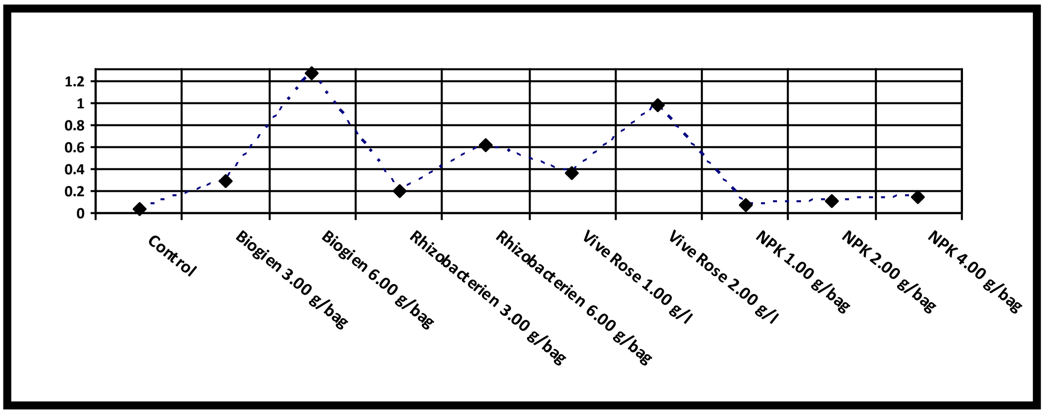
Table 3. Effect of fertilization treatments on Photosynthetic pigments of *P. halepensis* leaves during 2012 seasons .

Treatments	Chlorophyll (a) (mg/g F.W.)	Chlorophyll (b) (mg/g F.W.)	Chlorophyll (a+b) (mg/g F.W.)	Carotenoids (mg/g F.W.)
Control	0.09 I	0.40 J	0.09 J	0.07 IJ
Biogien 3.00 g/bag	0.62 E	0.28 E	0.75 E	0.38 DE
Biogien 6.00 g/bag	1.55 A	0.88 A	1.97 A	0.88 A
Rhizobacterien3.00g/bag	0.28 F	0.18 F	0.40 F	0.20 F
Rhizobacterien6.00g/bag	0.84 C	0.51 BC	1.30 C	0.62 BC
Vive Rose 1.00 g/l	0.76 D	0.45 CD	0.93 D	0.44 D
Vive Rose 2.00 g/l	1.14 B	0.55 B	1.54 B	0.77 B
NPK 1.00 g/bag	0.17 H	0.80 I	0.15 HI	0.07 I
NPK 2.00 g/bag	0.24 G	0.11 GH	0.20 GH	0.10 H
NPK 4.00 g/bag	0.24 G	0.14 FG	0.22 G	0.18 FG

Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test (DMRT) at 5% level.

Nutrient uptake (g/tree):

The results in (Fig. 6) showed the effect of bio and chemical fertilization treatments at different rates on nutrient uptake. Fertilizing seedlings of pine with "Biogien" at 6.00 g/bag and "Vive Rose" at 2.00 g/l recorded high significant increments of nutrient uptake as compared to the control or other treatments in the two seasons.



6.Histogram showing the effect of bio and chemical fertilization on nutrient uptake (g/plant) of *P. halepensis* during 2012 season.

Table 4. Effect of fertilization treatments on chemical composition of *P. halepensis* during 2012 season.

Treatments	Total indoles (mg/g F.W.)	Total phenols (mg/g F.W.)	Mineral ions as		
			N%	P%	K%
Control	0.11 A	0.21B	0.15 F	0.15 G	0.80 G
Biogien 3.00 g/bag	0.11 A	0.22AB	0.70 C	0.95 D	1.12 C
Biogien 6.00 g/bag	0.11 A	0.25A	0.84 B	3. 79 B	1.61 A
Rhizobacterien3.00g/bag	0.11 A	0.21B	0.80 B	0.34 E	1.06 D
Rhizobacterien6.00g/bag	0.11 A	0.21B	0.84 B	2.34 C	1.24 B
Vive Rose 1.00 g/l	0.12 A	0.21B	0.80 B	0.95 D	1.15 C
Vive Rose 2.00 g/l	0.12 A	0.19B	0.98 A	4.09 A	1.24 B
NPK 1.00 g/bag	0.09 B	0.19C	0.20 E	0.18F	0.90 F
NPK 2.00 g/bag	0.11 A	0.12D	0.20 E	0.22 F	0.98 E
NPK 4.00 g/bag	0.11 A	0.10 D	0.42 D	0.28 E	1.15 C

Means within a column having the same letters are not significantly different according to Duncan's Multiple Range Test (DMRT) at 5% leve

CONCLUSION

The addition of Biogien at 6.00 g/bags was most effective in obtaining attractive and high-quality seedlings of *P. halepensis* grown in 14 cm diameter bags with monthly applications from March to May as a requirement to obtain the best and strongest seedlings, as well as to shorten the time in the nursery in order to reduce the cost of seedlings production and benefit our environment.

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تأثير بعض الأسمده الحيويه و الكيماويه على النمو والتركيب الكيماوي لشتلات الصنوبر الحلبي

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أجري هذا البحث في مشتل قسم بحوث الأشجار الخشبية - معهد بحوث البساتين بالجيزة- خلال موسمين زراعيين متتاليين هما ٢٠١١ و ٢٠١٢ بهدف تحديد السماد و الجرعة المناسبة لانتاج شتلات قويه جيدة النمو من الصنوبر الحلبي باستخدام السماد الحيحوي بالبيوجين أو الريزوبكترين) بمعدل صفر و ٣.٠٠ و ٦.٠٠ جرام / كيس والسماد الكيماوي فيفا روز كسماد ورقي بمعدل ١.٠٠ و ٢.٠٠ جرام / لتر و NPK (١:١:١) بمعدل ١.٠٠و ٢.٠٠و٤.٠٠ جرام / كيس) علي شتلات عمر عام تنمو في أكياس سوداء بلاستيكيه قطر.١٤.٠٠سم تحتوي علي بيئة تتكون من ٧٠٠جرام من الطمي والرمل بمعدل (١:١ بالحجم).

أوضحت نتائج البحث الي ما يلي-:

-أعطت معاملة الكنترول أقل زياده في أرتفاع النبات/سمك الساقSQ (مقارنة بباقي المعاملات.

-أدي أضافه البيوجين بمعدل٦.٠٠جرام لكل كيس إلي زياد معنوية في كل من أرتفاع النبات و سمك الساق و عدد الأفرع وعدد الأوراق و الطازج والجاف و للأجزاء الخضرية لأوراق والساق كذلك الوزن الطازج والجاف للجذور و معدل نمو الساق وكذلك السمك والنسبة المئوية للنباتات الحية و الكتلة الجافة و امتصاص النيتروجين بمقارنة الكنترول والمعاملات الأخرى في كلا الموسمين.

- من ناحية أخر أضافه ٦.٠٠ جرام /كيس من الريزوبكترين كما استخدام الفيفا روز ٢.٠٠ جرام /لتر الي زياد طول الجذور ومحتوي الأوراق من كرورفيل ب والكاروتينويدات والنتروجين والبوتاسيوم ، في حين وجد أن أضافة٣.٠٠جرام /كيس من الريزوبكترين أدي لزياد جودة النمو في كلا الموسمين.

التوصية :

ينصح بتسميد شتلات الصنوبر عند زراعتها في أكياس بلاستيكية سوداء قطرها ١٤سم بمعدل ٦.٠٠ جرام بيوجين/ كيس ثلاث مرات وابتداء من شهر مارس الي مايو للحصول علي أفضل نمو من حيث معدل نمو لشلالت مما يساعد في الحصول علي شلات قويه لتقليل فترة بقائها في المشتل مما يقلل من تكاليف الإنتاج بالاضافه إلي أفادته للبيئة.