

The impact of Some Nutrients Substances on Germination and Growth seedling of *Pistacia vera* L.

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Abstract: The effect of some plant nutrients substances on germination and growth of some pistachio cultivars (Ashouri-Batouri- Olaimi) were studied during 2008 and 2009. The best result of germination value (germination velocity - germination force) were 7.9 of Olaimi cultivar, also applying (algae extraction) to the soil was more effective comparing with the other treatments and control. The average length of the seedling was 13.39 cm, the diameter 2.6 mm. during three months from the end of the germination. Therefore, we could make the successful grafting process in the same season. It could be concluded that using (biohealth + Humic) treatment during planting seeds encourage the speed of germinations which reflects on length of the seedling .As well as, the applying algae extraction to Pistachio seedlings cultivars through the soil was more effective in early grafted in the same season. In the same trend the highest response of experiment treatments was Olaimi cultivar seeds.

Key words: Pistachio, algae extraction, Humic, amino acids, germination and growth vigor

INTRODUCTION

Egypt exported a great amount of pistachio every year in addition, Egypt is classified as arid and semi arid lands so the pistachio trees could be suitable to cultivate under this condition, therefore this study was carried out in Egypt through the cooperation program with Syria for trying to cultivate pistachio trees in Egypt and overcome the problems of seed germination and growth seedlings by applying some nutrients substances. One of the nutrient substances is humic acid which benefits particularly in low organic matter, alkaline soil, include increased nutrient uptake, tolerance to drought and temperature extremes, activity of beneficial soil microorganisms and availability of soil nutrients. Humic materials may also increase root growth in a manner similar to auxins (Saleh *et al.* 2006). Applying humic acid, organic and biofertilizer may be useful to minimizing the amount of mineral fertilization (Abd El-Monem *et al* 2008).

Also, using algae (seaweed) as fertilizer were early to improve soil fertility (Finck,1982). Applying alge extractions to the soil improving soil characteristics which reflects on plant nutrition (Al-Gosaibi,1994) and providing favorable habitat for raising number of soil microorganisms, which reduce several cations and increase their availability for plants (Kabata-Pendies and Pendias, 1986).

Aaliabadi(2006). Studied the effects of different treatments on vegetative factors of *Pistacia vera*. seedling treated with Cycocel, root pruning and treatment with copper sulfate, some kinds of parameters have been measured in shoot organs. There was a significant difference between Cycocel liquid and other treatments in all characteristics (seedling length, number of leaf area of leaf, diameter of crown, dry and fresh leaf weight, dry and fresh stem weight).

Ghoraishi (2006) describes the micropropagation of *P. mutica*, which is being used as rangeland tree and rootstock for *P. Vera*. *P. mutica* can be propagated by seed, but seed germination in the natural habitat is usually below 10%. Seeds were collected and germinated under greenhouse conditions.

The aim of this study is to increase the growth vigor of pistachio seedlings so we could be grafted in the same season by using organic compounds and also to improve the germination percentage of pistachio cultivars

MATERIALS AND METHODS

The present study was carried out during two successive season of 2008 and 2009 in the faculty of agriculture, Ain Shams University, Egypt. This study included two experiments; the first experiment consists

of five treatments, which used combinations of organic compounds with different concentrations on seed germinations of three cultivars of Pistachio (Ashouri- Batouri- Olaimi). The second experiment consists of eight treatments used different concentrations of organic compounds to investigate the effect on seedling growth of Ashouri cv.

Plant Material and Cultivation:

The following organic compounds were used in this study.

Biohealth (B):

organic compound contains of k 9%, chelated Fe 1%, chelated Ca 1%, amino acids, cytokinins and gibberellins

Humic (H):

Extraction contains of active humic acid 8%, Organic substance 72.3%, active folic acid 1% , chelated macro and micro elements

Algreen (A):

Compound contains of growth regulators (gibberellins, auxins, cytokinins),macro and micro elements (N,P,K),free amino acids, carbohydrates, vitamins and algae

Aminofit-10:

Compound consists of free amino acids 10%

Algae Extraction:

It produced by fertilization technology dept. of National Research Center, Egypt. The concentration of the elements as in table (1)

Table 1: Nutrient concentrations in the algal bulk of *Scenedesmus* sp. (on dry weight basis at 70°C)

ppm	%Cu	Mn	Zn	Fe	Na	Mg	Ca	K	P	N
7.4	57.8	63.4	18.50	0.11	0.60	0.38	0.35	1.3	8.61	

*= 4.65% in the fresh algal bulk (46% moisture)

1- First experiment

Germination experiment:

The 500 seeds of each cultivar of pistachio (Ashouri, Batouri, Olaimi) were treated as the following:

Treatments	Germination experiment
1	(2gm Algreen +1 gm Biohealth+1gm. Humic)/ liter water
2	(2gm Algreen +1 gm Biohealth)/ liter water
3	(2gm Algreen +1gm. Humic)/ liter water
4	(1 gm Biohealth+1gm. Humic)/ liter water
5	control (soaking in water only)

Where 100 seeds for each treatment, 25 seeds per replicate. The seeds soaked for 24 hours in water then get out and treated by the previous treatments for one hour. The seeds cultivated in small plastic cups 5X5 cm, the soil was mixture of peatmoss and sand. All the experiments were in net green house

Measuring parameters:

Seed germination was evaluated by final germination percentage and germination force during experiment as follows.

Germination Value (GV):

Germination value detected according to the following formula,

$$GV = PV \times MDG$$

Which it was recommended for germination of perennial trees seeds where

PV: Peak Value (germination percentage at the starting point of germination rate decreased divided on number of days at this point.

MDG: Mean Daily Germination (final germination percentage divided on number of germination days (Hartmann1975)

2-second Experiment:

Seedling Growth Experiment:

After seed germination 256 seedlings were selected of Ashouri cv. with length 8-10 cm and had 6-8 leaves, they distributed into four replicates,8 plants in each replicate were treated as the following:

Treatments	Seedling growth experiment
1	40 gm Algreen / 10 liter water
2	60 gm Biohealth/ 10 liter water
3	(40 gm Algreen + 60 gm Biohealth)/ 10 liter water
4	40 ml Amino acids/ 10 liter water
5	40 gm Humic/ 10 liter water
6	(40 ml Amion acids+40 gm Humic) / 10 liter water
7	200 gm Algae extraction/ 10 liter water
8	control

Each plant was irrigated about 250 ml of the nutrient solution according to its treatment every two weeks.

Measuring parameters:

Four plants from each treatment were randomly selected and destructive measurements were carried out to record the following data:

Seedling growth vigor as follow:

Plant length/cm, Leaves no./plant and Thickness/mm as well as fresh and dry weight for leaves, stem and roots.

Statistical analysis:

The statistical design was complete randomized, least significant differences (LSD) were evaluated by MSTAT program. Means with different letters are significant at 0.05% level.

RESULTS AND DISCUSSIONS

Germination:

Effect of the treatments on germination percentage cleared in tables (2,3,4) of three cultivars respectively, Ashouri seeds were germinated after 14 days from planting and the seeds were soaked in the solution of (Biohealth+Humic) increased the germination rate where germination percentage was 80% comparing with control seeds.Meanwhile 60% of followed seeds which soaked in the solution (Biohealth+Algreen, Humic+Algreen) where the germination percentage was 74%. Seeds germinated completely on 10 May, after 45 days from planting. The seeds were soaked in the solutions of (Biohealth+Humic, Algreen+Humic, Algreen+Biohealth, Algreen+Biohealth+Humic) got significantly increased in germination percentage 66%,74%,47% and 80% respectively compared with control seeds 60%.

Table 2: Germination percentage of Ashouri cv. during 10 April to 19 May(average of two seasons)

Date Treatment	10/4	12/4	15/4	20/4	24/4	29/4	8/5	10/5	19/5
A+B+H	23 b	30 c	36 b	42 bc	49 bc	55 bc	58 b	66 bc	66 bc
A+B	25 b	33 bc	42 ab	52 ab	60 ab	65 ab	68 a	74 ab	74 ab
A+H	39 a	47 a	50 a	58 a	60 ab	64 ab	68 a	74 ab	74 ab
B+H	30 ab	43 ab	15 a	59 a	64 ab	70 a	73 a	80 a	80 a
control	23 b	26c	32 b	51 a	45 c	50 c	54 b	60 c	60 c
LSD	9.84	12.96	11.08	11.36	10.8	11.84	7.48	8.44	8.4

Batouri seeds were germinated after 14 days from planting and soaked solutions were (Algreen+Biohealth) increased the germination rate express as germination percentage which was 83% comparing with control seeds 41% followed seeds which soaked in solution (Algreen+ Biohealth+ Humic) where the germination percentage was 79%. Seeds were germinated completely on 19 May,after 55 days from planting. Seeds were soaked in

the solutions of (Algreen+Humic, Biohealth+Humic,) got significantly increased in germination percentage 71%,68% respectively compared with control seeds 41%.

Table 3: Germination percentage of Batouri cv. during 10 April to 19 May(average of two seasons)

Date Treatment	10/4	12/4	15/4	20/4	24/4	29/4	8/5	10/5	19/5
A+B+H	10bc	20 a	32 a	43 a	52 a	60 a	65 ab	68 ab	79 ab
A+B	15 a	20 a	32 a	45 a	54 a	60 a	70 a	72 a	83 a
A+H	13ab	20 a	24 ab	39 a	43 b	48 b	58 c	60 b	71 b
B+H	6 cd	8 b	16 bc	29 b	31 c	44 b	60 bc	62 b	68 b
Control	2 d	5 b	8 c	10 c	15 d	20 c	25 d	30 c	41 c
LSD	4.6	8.12	8.68	9.08	8.24	7.92	6.48	8.12	8.2

Olaimi seeds were germinated after 14 days from planting and the seeds were soaked in the solution of (Biohealth+Humic, Algreen+Biohealth) had more effective on increasing the germination rate express as germination percentage which was 84% and 81% comparing to control seeds 57% followed seeds which soaked in solution (Algreen+ Humic) where the germination percentage was 79%. Seeds germinated completely on 19 May, after 55 days of planting. Seeds were soaked in the solutions of (Algreen+ Biohealth+ Humic,) got significantly increased in germination percentage 73% compared with control seeds 57%.

Table 4: Germination percentage of Olaimi cv. during 10 April to 19 May(average of two seasons)

Date Treatment	10/4	12/4	15/4	20/4	24/4	29/4	8/5	10/5	19/5
A+B+H	13 a	15 b	18 b	28 c	55 a	60 b	65 b	66 c	73 b
A+B	3 b	12 bc	20 b	25 c	52 a	66 ab	70 b	74 ab	81 a
A+H	5 b	9 bc	22 b	36 b	50 a	60 b	68 b	71 b	79 ab
B+H	12 a	22 a	29 a	45 a	54 a	70 a	75 a	78 a	84 a
Control	1 b	8 c	16 b	24 c	33 b	39 c	46 c	49 d	57 c
LSD	5.28	6.12	6.68	7.20	15.04	9.68	5.00	4.16	6.24

The results cleared that Ashouri cv. seeds was the fastest in germination compared to Batouri and Olaimi cv. whereas, the highest germination percentage was obtained with Olaimi cultivar.

Biohealth and Algreen compounds considers as growth regulators because it's contains amino acids, cytokinins and gibberellins which caused an increasing in the fasting and percentage of germination seeds. This may contribute to increase the cell division and the growth rate of seedlings.

All germination value increased with all treatments and cultivars compared with control. Olaimi was the highest germination value as cleared in table 5 also in the figures (1, 2, 3) cleared the germination value of the three pistachio cultivars Ashouri, Batouri and Olaimi respectively

Table 5: Germination value of pistachio cultivars (Ashouri, Batouri and Olaimi)(average of two seasons)

Treatments	Ashouri	Batouri	Olaimi
A+B+H	4.35	6.05	7.21
A+B	5.97	5.32	7.67
A+H	7.82	3.76	7.23
B+H	6.88	3.73	7.91
Control	4.38	1.10	3.43

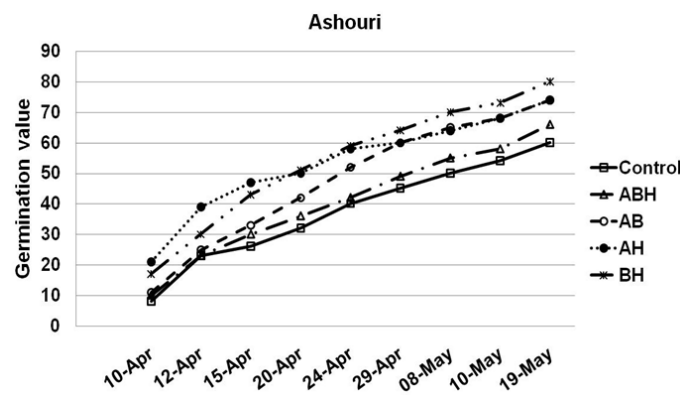


Fig. 1: The germination value of Ashouri cv. seed

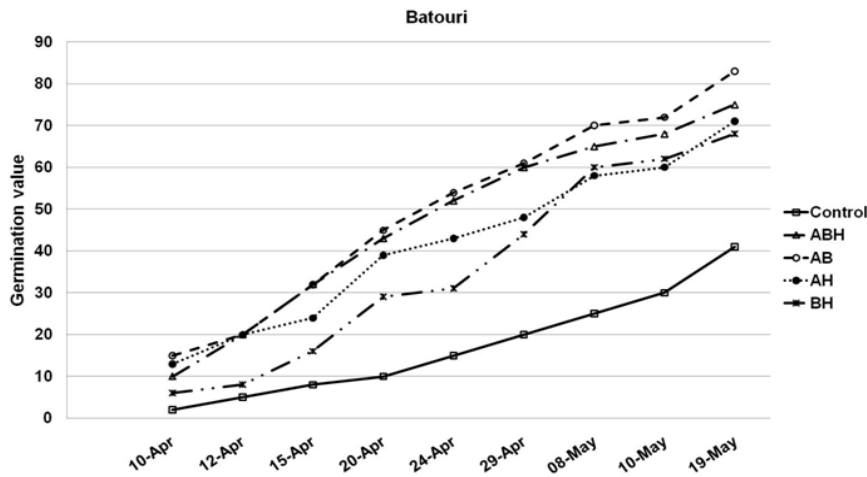


Fig. 2: The germination value of Batouri cv. seeds

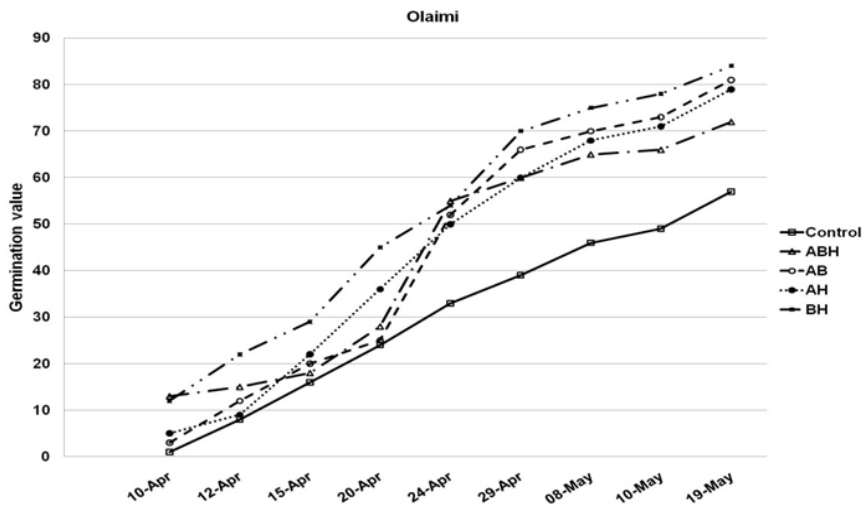


Fig. 3: The germination value of Olaimi cv. seeds

Seedling growth vigor:

Effect of the treatments of nutrients compounds on growth vigor (plant length, leaves number and stem thickness cleared in table 6. Where algae extraction treatment gave the best results and significant differences compared to all treatments, this refer to algae extraction contains most macro and micro elements which increased the seedling length to 13.39 cm during 3 month , the leaves number was about 23 and the stem thickness was about 4 mm which is very important for grafting process in the same year while the length of control seedling were 8.35 cm, 14 leaves and 2.6 mm stem thickness, also algae treatment was the highest values in the fresh and dry weight of leaves, stems and roots followed by Aminofit treatment then the Humic as show in table 7.

Table 6: Effect some nutrients on growth vigor of Ashouri seedlings

Treatments	Plant length/cm	Leaves no./plant	Thickness/mm.
Algreen	9.105 bc	14.03 c	2.673 cd
Biohealth	10.30 b	15.62 bc	2.735 cd
Algreen + Biohealth	10.05 b	15.78 bc	2.905 bcd
Amino fit	9.235 bc	16.66 bc	2.947 bc
Humic	9.155 bc	17.81 b	3.060 b
Amino fit + Humic	9.450 bc	18.31 b	3.223 b
Algae extraction	13.39 a	23.27 a	4.025 a
Control	8.35 c	13.75 c	2.601 d
LSD	1.61	3.07	0.32

Table 7: Effect some nutrients on fresh and dry weight of stem, leaves and roots of Ashouri seedlings

Treatments	Leaves			Stem			Roots	
	No. leaves	Fresh weight gm.	Dry weight gm.	Length cm.	Fresh weight gm.	Dry weight gm.	Fresh weight gm.	Dry weight gm.
Algreen	16.42 d	1.57c	0.58c	21.25 c	1.4c	0.49 c	1.2c	0.57 c
Biohealth	17.75 cd	1.90c	0.79 bc	31.33 ab	1.41 bc	0.67 bc	1.21 c	0.56 c
Algreen+ Biohealth	20.33 cd	2.46 bc	0.87 bc	30.58 ab	1.54 bc	0.70 bc	1.84 bc	0.83 bc
Amino fit	21.17 bcd	2.68 bc	1.06 bc	30.17 ab	1.78 bc	0.86 bc	2.06 bc	0.99 bc
Humic	21.67 bc	2.64 bc	1.04 bc	29.50 ab	1.78 bc	0.85 bc	2.25 b	1.09 bc
Amino fit + Humic	25.75 ab	3.22b	1.35 b	31.00 ab	2.05 b	1.0 ab	2.44 b	1.20 b
Algae Extraction	29.00 a	5.01 a	2.15 a	35.08 a	2.91 a	1.34 a	4.78 a	2.35 a
Control	17.92 cd	1.88 c	0.73 bc	26.42 bc	1.27 c	0.59 bc	1.44 bc	0.72 bc
LSD	4.8	1.13	0.63	7.6	0.71	0.41	1.02	0.58

This results agreed with Abdel-Maguid *et al.*,(2004).Used green algae as soil application on olive seedlings and found that, root dry weight/transplant showed significant increases with all treatments containing green algae as compared with control due to the stimulative effect of auxins, which naturally occur in the green algae, for root growth. Auxins have been shown to naturally occur with considerable amount in the green algae (Thimann *et al.*,1942). Auxins stimulate establishment and elongation rate of root hairs or increase their number according to concentration (Devlin and Jackson,1961).Plant height, root and shoot dry weights of maize plants were significantly increased with soil application of increased levels from the dried green alga *Chlorella vulgaris* under NPK common fertilization (Shaaban 2001).

Conclusion:

In conclusion, our results show that, all the seeds treatments of nutrients had good results in germination value compared by control. Using algae extraction of Ashouri seedlings where had the highest shoots and roots growth vigor therefore can speed up the growth and graft process, as well as, we could recommended that the applying organic compounds to the seeds or seedlings of Pistachio could be useful for nurseries working in Egypt to improve the growth vigor of seedlings which reflects on grafting process.

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