EFFECT OF SOME TREATMENTS ON SEED GERMINATION AND SEEDLING GROWTH OF *THEVETIA NEREIFOLIA*, JUSS. SHRUB.

By

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ABSTRACT

A study was carried out at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, Egypt, during the two successive seasons of 2007 and 2008 to investigate the effect of some pre- germination treatments on seed germination of *Thevetia nereifolia*, Juss. and attain the most suitable treatments for production of healthy seedlings. Seeds were subjected to nine treatments before sowing i.e. soaking in H_2SO_4 (98.5%) for 2 and 4 min., tap water for 24 hrs, GA_3 at 500 and 1000 ppm for 24 hrs, humic acid 30cm L^{-1} for 24 hrs and the combination treatments of H_2SO_4 for 4 min. + humic acid for 24 hrs, H_2SO_4 for 4 min. + GA_3 at 1000 ppm for 24 hrs and untreated seeds (control). The results could be summarized as follows:

All pre-germination treatments significantly increased germination percentage, germination velocity, germination rate index, plant height, number of leaves/ plant, stem diameter, leaf area, as well as fresh and dry weights of aerial parts and roots, root length and leaves total green color (SPAD). However, mean germination rate and total phenols were significantly decreased as compared to the control in both seasons. Therefore, seeds must be soaked before planting in either H_2SO_4 (98.5%) for 4 min., or its combinations with humic acid 30cm L^{-1} for 24 hrs or GA_3 at 1000 ppm for 24 hrs.

Keywords: *Thevetia nereifolia*, Juss. Pre-germination treatments, H_2SO_4, Humic acid.

INTRODUCTION

Yellow oleander (*Thevetia nereifolia*, Juss.) is an ornamental shrub of the Apocyanaceae family that is common throughout the tropics and subtropics, flowers bloom from summer to fall. It is usually used in a variety of landscape including hedges, screens,

container plant for sunny decks, foundation plantings and borders. Also, its sap contains cardiac glycosides that are toxic to cardiac muscle and the autonomic nervous system, the seeds contain a heart stimulant, and plant saps can cause allergic skin reactions in some people.

The seeds of this shrub have an impermeable and hard seed coat which prevents penetration of water and oxygen into the seeds. This may be removed by soaking in sulphuric acid, humic or gebberellic acids and tap water which may help in softening the seed coat and/or removing inhibitors of germination. For this purpose the recent study was carried out to improve of germination traits and obtain healthy seedlings. Many investigators carried out experiments dealing with the response of some ornamental trees and shrubs seeds to some pre-germination treatments, in this concern, Russo *et al.*, (1994) obtained the fastest germination by 4 days, first true leaves, 31.5-32.2% longer roots and 22.4-29.9% greater shoots DW when *Tagetes erecta* seeds were sown in a medium wetted with a 1% solution of humic acid. Kokurmikova and Satsyperova (1997) reported that, *Podophyllum hexandrum* seeds treated with various concentrations of H_2SO_4 showed an increase in germination ability and sprouting energy. The best results were obtained by immersing seeds in concentrated acid for 1 min., 50% H_2SO_4 for 2 min., or 10% H_2SO_4 for 10 min. Also, Ogzewalla and Harnischfeger (1997) on *Baptisia tinctoria* seeds reported that, H_2SO_4 promoted germination (69-80%) compared with 8-11% for control. Salama (1997) stated that, pre- germination treatment of *Melia azedrac*h seeds with H_2SO_4 (98%) for 3 min., produced higher germination percentage (96-100%) compared to 80-76.6% for the control. Likewise, Mahmoud (1999) indicated that, the highest G%, earliest germination (G.V.), the least M.G.R. and highest G.R.I. were obtained from the treatment of soaking Pterocapus seeds in H_2SO_4 for 2 min., as it also increased appreciably the height of transplants, root length, fresh and dry weights of aerial parts and roots and total indole contents in the seeds was increased while total phenols was significantly decreased.

On *Taxodium distichum, Grevillea robusta* and *Cupressus sempervirens*, Ebrahiem (2002) found that, soaking seeds in GA_3 at 200 and 400 ppm gave the highest germination percentage and minimum period for germination as well as tallest seedling and

roots, thickest seedling, highest number of leaves and heaviest fresh and dry weights of the vegetative parts and roots. He stated also that, the highest germination percentage and minimum time for germination were obtained from soaking seeds in water for 72 hrs. The germination of *Parkinsonia aculeata* seeds ranged between 76-99% compared with control by soaking in H_2SO_4 for 60 min., (Ali, 2003). Hassan (2003) on *Enterolobium cyclocarpum* reported that, the significantly highest values of plant height, fresh and dry weights of aerial parts, stem diameter, root length as well as fresh and dry weights of roots were obtained from the treatment of soaking seeds in H_2SO_4 for4 min. + GA_3 at 500 ppm for 24 hrs. The highest germination percentage of *Murraya exotica* seeds resulted from soaking in GA_3 at 250 ppm for 4 hrs whereas 100 ppm for 24 hrs were suitable for *Acokanthera spectabilis.* Muhammad and Amusa (2003) on *Tamarindus indica* indicated that, the highest germination percentage was recorded in seeds treated with 50% H_2SO_4 for 60 min. Germination was observed to be enhanced by the increase in the H_2SO_4 concentration. Hegazi (2007) recommended soaking *Calliandera haematocephala* seeds in GA_3 at 1000 ppm for 24 hrs or concentrated H_2SO_4 for 1 min., to obtain the best germination results i.e. germination %, germination velocity, germination rate index, plant height, root length, leaf area, number of leaves / plant, stem diameter, fresh and dry weights of aerial parts and roots /plant and chlorophyll a and with a decreased total phenols % as compared to the control.

MATERIAL AND METHODS

The present investigation was carried out during two successive seasons of 2007 and 2008 at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, Egypt, to study the Effect of some pre-germination treatments on seed germination traits and seedling growth of *Thevetia nereifolia*, Juss., shrub .The seeds were collected from certain mother shrubs grown in the garden of Faculty of Agriculture Kafer El-Sheikh during summer and autumn months. Seeds were subjected to 9 different treatments as follows:

1. Control (untreated seeds)
2. Soaking seeds in a tap water for 24 hours

3. Soaking seeds for 24 hours in an aqueous solution of GA_3 at the concentration of 500 for 24hours.
4. Soaking seeds for 24 hours in an aqueous solution of GA_3 at the concentration of 1000 ppm for 24 hours.
5. Soaking seeds in humic acid (the recommended concentration of the commercial product Actosol at 30 cm/L^{-1}) for 24 hours.
6. Soaking seeds in a concentrated sulphuric acid (98.5%) for 2 minuets then washed before planting.
7. Soaking seeds in a concentrated sulphuric acid (98.5%) for 4 minuets then washed before planting.
8. Soaking seeds in a concentrated sulphuric acid (98.5%) for 4 min then washed and soaked in humic acid 30 cm/L^{-1} (Actosol) for 24 hours.
9. Soaking seeds in concentrated sulphuric acid (98.5%) for 4 min then washed and soaked in GA_3 at 1000 ppm for 24 hours.

The seeds were sown in clay pots of 50 cm diameter filled with a mixture of clay and sand (2:1 v:v) on 17th March in both seasons. The statistical used was completely randomized as nine treatments were replicated three times and distributed within each block, each replicate contained three pots, and each pot contained 15 seeds. Therefore, every treatment consisted of 135 seeds for each season. The following data were recorded:

1-Number of germinated seeds counted every day till germination became constant and seed germination percentage and rate were calculated using the following equation:

$$G\% = \frac{No.of.germimated.seeds}{Total.seed.number} X100$$

2-Germination velocity (G.V) = Number of days from sowing until emergence of the plumule.

3-Mean germination rate (M.G.R) = Number of days to attain 50% of total germination (Odetola, 1987).

4-Germination rate index (G.R.I) was calculated according to bartled equation (Hartmann and Kester, 1983) as follows:

$$G.R.I. = \frac{A(A+B)+(A+B+C)}{N(A+B+C)}$$

Where A, B and C =number of germinated seeds counted at different times.

N= number of times at which the germinated seeds were counted.

5-Percentage of total phenols in seeds for the two seasons after seeds had been treated using the method of A.O.A.C. (1990).
6- Total green color in fresh leaves (SPAD).

At the end of the experiment after about 6 months from sowing, the following data were recorded on all the obtainod transplants:

1- Plant height (cm). 2- Root length (cm).
3- Leaf area/plant (cm^2). 4- Number of leaves /plant.
5- Stem diameter (cm).
6- Fresh and dry weights of aerial parts / plant (g).
7- Fresh and dry weights of roots/ plant (g).

Means of all data were compared using Duncan's multiple range tests according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

1. Effect on some germination traits:-

A. Germination percentage (G %):

Data presented in Table (1) showed that soaking seeds in H_2SO_4 for 4 minuets then in humic acid for 24 hrs significantly increased seed germination percentage over all other treatments in both seasons as recorded 99.90 and 96.07 %, respectively. This was followed by the treatments of H_2SO_4 for 4 minuets in the first season and H_2SO_4 for 4 minuets + GA_3 at 1000 ppm for 24 hrs in the second one as recorded 95.11 and 91.13 %, respectively. The significantly lowest germination percentage in both seasons resulted from seeds treated with GA_3 at 500 ppm for 24 hrs and control (untreated seeds). The other treatments gave intermediate values with significant differences among themselves in most cases in both seasons. This may be due mainly to that *Thevetia nereifolia*,Juss., seed coat is very hard and can be overcome by soaking in H_2SO_4 as it softens seed coat also, humic acid hastened the seed germination through working as a feeding source and the stimulatory effect of GA_3 on hydrolytic enzymes, which resulted in increasing seed germination. These results are in accordance with those of Kokurmikova and Satsyperova (1997) on *Podophyllum hexandrum*, Salama (1997) on *Melia azedarach* and Amusa (2003) on *Tamarindus indica*.

B. Germination velocity (G.V.):

It is clear from data in Table (1) that, the significantly lowest days number from sowing until emergence of the plumule in both seasons resulted from seeds soaked in H_2SO_4 for 4 minuets followed by that soaked in H_2SO_4 for 4 minuets in the first season and H_2SO_4 for 4 minuets + GA_3 at 1000 ppm for 24 hrs in the second one then in humic acid for 24 hrs as gave 25.40, 19.36; 27.37 and 21.29 days, respectively. The highest day's number resulted from seeds soaked in GA_3 at 500 ppm for 24 hrs or control (untreated seeds) in both seasons. The other treatments were ranked gradually among themselves with significant differences in all cases. These results are in a harmony with those of Ebrahiem (2002) on *Taxodium distichum, Grevillea robusta* and *Cupressus sempervirens* and Mohammad and Amusa (2003) on *Tamarindus indica.*

Table (1): Effect of some prgermination treatments on germination percentage (G%) and germination velocity (G.V) of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	G %		G.V. (days)	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	61.08h	55.37i	37.37b	35.23a
Tap water for 24 hrs.	70.10g	85.43e	36.37c	32.27c
GA_3 at 500 ppm for 24 hrs.	70.04g	75.33h	37.47a	32.60b
GA_3 at 1000 ppm for 24 hrs.	89.70c	77.06g	35.37e	27.33e
Humic acid for 24 hrs.	80.83f	88.40d	36.30d	31.14d
H_2SO_4 for 2 min.	85.50e	82.20f	29.30f	25.17g
H_2SO_4 for 4 min.	95.11b	91.10c	25.40i	19.36i
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	99.90a	96.07a	28.27g	21.29h
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	88.20d	91.13b	27.37h	25.30f

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

D. Mean germination rate (M.G.R):

Data in Table (2) revealed that, the significantly least number of days to attain 50% of total germination resulted from seeds soaked in H_2SO_4 for 4 minuets followed by H_2SO_4 for 4 minuets + GA_3 at 1000 ppm for 24 hrs in both seasons as recorded 32.27, 25.20; 33.23 and 28.13days, respectively. The longest time to attain the corresponding percentage were resulted from seeds soaked in tap water in the first season and untreated seeds (control)

in both seasons as recorded 43.27 and 39.7 days, respectively. The others treatments gave an intermediate values with significant differences in all cases. This may be due to that the acids (H_2SO_4 and humic) softend the seed coat, besides the stimulatory and feeding effects, which helps in accelerating the germination. Similar results were obtained by Mahmoud (1999) on Pterocapus seeds and Hegazi (2007) on *Calliandera haematocephala.*

E. Germination rate index (G.R.I.):

It is evident from data in Table (2) that the significantly highest germination rate index values resulted from the seeds soaked in H_2SO_4 for 4 minuets whereas the lowest values resulted from untreated seeds (control). The other treatments were gradually remarked among them with significant differences in all cases in both seasons. These results are in agreement with those of Kokurmikova and Satsyperova (1997) on *Podophyllum hexandrum* and Hegazi (2007) on *Calliandera haematocephala*

Table(2) Effect of some prgermination treatments on mean germination rate (M.G.R) and germination rate index(G.R.I) of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	M.G.R.		G.R.I	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	43.25a	39.97a	0.41i	0.38i
Tap water for 24 hrs.	43.27a	35.40d	0.69g	0.71g
GA_3 at 500 ppm for 24 hrs.	42.43b	36.23c	0.56h	0.51h
GA_3 at 1000 ppm for 24 hrs.	42.17d	35.37e	0.74f	0.80d
Humic acid for 24 hrs.	42.30c	37.36b	0.77e	0.78e
H_2SO_4 for 2 min.	36.37e	30.21f	0.78d	0.75f
H_2SO_4 for 4 min.	32.27h	25.20i	0.93a	0.91a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	36.13f	28.26g	0.91b	0.89b
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	33.23g	28.13h	0.89c	0.87c

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

2. Effect on some growth traits

A. Plant height:

It is clear from data in Table (3) that, all pre- germination treatments gave taller seedlings than control with significant differences in all cases in both seasons. The tallest seedling resulted

from the seeds soaked in concentrated H_2SO_4 for 4 min., as gave 49.6 and 64.6 cm followed by the seeds soaked in H_2SO_4 for 4 min. + humic acid as gave 39.4 and 46.1 cm against 14.9 and 20.1cm for control in the first and second seasons, respectively. Similar results were obtained on various plants, as Ali (2003) on some leguminous trees who reported that, H_2SO_4 affected softening of seed coat especially at suitable acid concentration and duration of soaking. Likewise, Hassan (2003) on *Enterlobium cyclocarpum* and Hegazi (2007) on *Calliandera haematocephala*.

B. Number of leaves per plant:

Data recorded in Table (3) raveled that all pre-germination treatments increased leaf number per plant over control with significant differences in most cases in both seasons .The significantly highest values resulted from the seeds soaked in H_2SO_4 for 4 min., as it recorded 50.6 and 64.6 against 16.0 and 16.0 for control in both seasons. The effect of soaking seeds in H_2SO_4 was presumed to increase water absorption as suggested by Pital and Wang (1983). This result was in agreement with those of Ebrahiem (2002) on *Taxodium distichum, Grevillea robusta* and *Cupressus sempervirens* and Hegazi (2007) on *Calliandera haematocephala* .

Table (3) Effect of some pre-germination treatments on plant height and number of leaves /plant of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	Plant height (cm)		No. of leaves / plant	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	14.90d	20.10f	16.00e	16.00e
Tap water for 24 hrs.	29.10c	33.20de	25.30cd	28.00c
GA_3 at 500 ppm for 24 hrs.	28.50c	33.70de	23.30d	24.00d
GA_3 at 1000 ppm for 24 hrs.	31.40c	34.80d	27.30c	30.00c
Humic acid for 24 hrs.	29.70c	31.10e	24.60cd	27.30cd
H_2SO_4 for 2 min.	31.40c	36.80cd	26.60c	30.00c
H_2SO_4 for 4 min.	49.60a	64.60a	50.60a	64.60a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	39.40b	46.10b	35.30b	37.30b
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	32.10c	38.20c	27.00c	30.60c

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

C. Leaf area:

The data Table (4) revealed that, all pre-germination treatments significantly increased leaf area as compared to the control in the first season as the highest values resulted from the treatment of soaking seeds in H_2SO_4 for 4 min as gave 540.32 against 139.53 cm^2 for control and the corresponding value in the second one was577.89 while the control gave 150.21 cm^2. The second rank lies the combination treatment of H_2SO_4 + humic acid as gave 352.62 and 358.37 cm^2 in the first and second seasons, respectively. This result was in agreement with those of Hegazi (2007) on *Calliandera haematocephala.*

D. Stem diameter:

Data in Table (4) indicated that, all pre-germination treatments resulted in significantly thicker transplants stem relative to the control in both seasons .Stem diameter of control treatment registered 0.31 and 0.43cm. However, the treatment of H_2SO_4 for 4 min., gave the significantly highest values as recorded 0.62 and 0.69 cm in the first and second seasons, respectively .The least values of stem diameter lither control were obtained from soaking seeds in GA_3 at rate of 500 ppm for 24 hrs recording 0.35 and 0.44 cm due perhaps to the role of GA_3 in cells enlargment. The obtained results are in conformity with Rahemi and Baninasab (2000) on *Pistacia mutica* and *Pistacia khinjuk* and Hassan (2003) on *Enterolobium cyclocarpum.*

Table (4): Effect of some pre-germination treatments on leaf area/ plant (cm^2) and stem diameter (cm) of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	Leaf area (cm^2)		Stem diameter (cm)	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	139.53g	150.21h	0.31f	0.43d
Tap water for 24 hrs.	148.40fg	173.78fg	0.38e	0.47d
GA_3 at 500 ppm for 24 hrs.	145.08fg	163.91g	0.35ef	0.44d
GA_3 at 1000 ppm for 24 hrs.	174.69e	193.78e	0.43d	0.46d
Humic acid for 24 hrs.	159.45f	184.81ef	0.43d	0.50c
H_2SO_4 for 2 min.	257.36d	275.24d	0.45c	0.55bc
H_2SO_4 for 4 min.	540.32a	577.89a	0.62a	0.69a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	352.62b	358.37b	0.53b	0.58b
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	286.33c	310.90c	0.52bc	0.56b

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

E. Fresh and dry weights of aerial parts:

It was obvious from the presentation in Table (5) that, all pre-germination treatments increased both fresh and dry weights of aerial parts over control with significant differences in most cases during the two seasons. For the fresh weight the significantly heaviest weights resulted from soaking seeds in H_2SO_4 for 4 min followed by the combination treatment of H_2SO_4 for 4 min., + humic acid then the combination treatment of H_2SO_4+GA_3 as gave 23.1, 20.2 and 16.7g, respectively in the first season against 14.2g for the control, while in the second one the corresponding values were 27.7, 22.6 and 18.0 g, respectively against 15.5g for control.

Table (5): Effect of some pre-germination treatments on fresh and dry weights of aerial parts (g/plant) of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	Aerial parts F. W.		Aerial parts D. W.	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	14.20f	15.20e	2.80e	3.20f
Tap water for 24 hrs.	15.20e	17.40cd	3.20d	3.56de
GA_3 at 500 ppm for 24 hrs.	15.50de	16.70d	3.26d	3.66e
GA_3 at 1000 ppm for 24 hrs.	16.50cd	17.8cd	3.33d	3.83de
Humic acid for 24 hrs.	16.00d	16.80d	3.30d	3.60e
H_2SO_4 for 2 min.	16.40cd	17.20cd	3.40d	4.03cd
H_2SO_4 for 4 min.	23.10a	27.70a	7.66a	8.40a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	20.20b	22.60b	5.83b	5.06b
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	16.70c	18.00c	4.66c	4.20c

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

As for dry weight similar trend was obtained as shown in (Table 5). The significantly lowest germination percentage in both seasons resulted from control (untreated seeds) whereas the highest values in both seasons resulted from the seeds soaked in H_2SO_4 for 4 min .The others treatments gave an intermediate values in both seasons. Similar results were attained by Russo *et al.* (1994) on *Tagetes erecta*, Mahmoud (1999) on *Pterocarpus delbergoides*.and Hassan (2003) on *Enterolobium cyclocarpum*.

F. Fresh and dry weights of roots:

Data in Table (6) showed that, all pre-germination treatments significantly increased fresh and dry weights of roots over control in

both seasons. In the first season the heaviest roots fresh weight resulted from concentrated H_2SO_4 for 4 min., as gave 10.1g followed by the combination treatment of H_2SO_4 for 4 min. + humic acid for 24 hrs then H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs as gave 7.5 and 6.5g against 3.9g for the control. As for dry weight of roots, a similar trend was obtained as the fresh weight as shown in Table (6). The stimulatory effect of such treatments may be due to that humic acid holds cations in a way they can be more easily absorbed by plant roots, improving micronutrient transference to the plant's circulation system. Similar effects were observed by Abd El-Dayem (1982) on *Cassia fistula,* Mahmoud (1999) on Pterocapus and Hassan (2003) on *Enterolobium cyclocarpum.*

Table (6): Effect of some pre-germination treatments on roots fresh and dry weights (g/ plant) of *Thevetia nereifolia,* Juss. during 2007 and 2008 seasons.

Treatments	Roots fresh weight/ plant (g)		Roots dry weight/ plant (g)	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	3.90f	5.00g	1.30h	1.60e
Tap water for 24 hrs.	4.80e	5.70f	1.70g	1.60e
GA_3 at 500 ppm for 24 hrs.	4.60ef	5.70f	1.40h	1.80e
GA_3 at 1000 ppm for 24 hrs.	5.80cd	6.60e	2.70e	3.00c
Humic acid for 24 hrs.	5.20d	5.90f	2.40e	2.40d
H_2SO_4 for 2 min.	6.00c	8.10d	3.00d	3.40b
H_2SO_4 for 4 min.	10.10a	11.50a	3.90a	4.10a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	7.50b	10.80b	3.60b	3.90ab
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	6.50c	9.70c	3.20c	3.70ab

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

G. Root length:

The results presented in Table (7) indicated that, all pre-germination treatments gave significantly longer roots than control in both seasons. The longest roots resulted from seeds soaked in concentrated H_2SO_4 for 4 min., as recorded 21.1 and 22.7cm, against 10.4 and 11.3 cm for the control during two seasons, respectively. In the second rank lie the values of the combination treatments of H_2SO_4 for 4 min., + humic acid followed by the combination treatment of H_2SO_4 for 4 min., +GA_3 as they gave 17.2

and 17.0cm in the first season and in the second one they gave 17.8 and 17.0 cm, respectively .The increase in root length with humic my be due to stimulating plant growth by accelerating cell division, increasing the rate of development in root system, and increasing the yield of dry matter. Gibberellic acid is one of the major plant hormones involved in the control processes for mobilization of food reserves from the endosperm or cotyledons most especially enzyme production (Black, 1972).

Table (7): Effect of some pre-germination treatments on root length (cm) and total green color (SPAD) of *Thevetia nereifolia*, Juss. during 2007 and 2008 seasons.

Treatments	Root length (cm)		Total green color (SPAD)	
	1st season	2nd season	1st season	2nd season
Control (untreated seeds)	10.40e	11.30h	37.80c	36.60e
Tap water for 24 hrs.	13.90cd	13.30f	39.06bc	39.86c
GA_3 at 500 ppm for 24 hrs.	13.10d	12.60g	39.23bc	39.60c
GA_3 at 1000 ppm for 24 hrs.	14.80c	15.00d	40.40b	37.23cd
Humic acid for 24 hrs.	14.50c	14.00e	40.86b	37.96cd
H_2SO_4 for 2 min.	15.20c	15.50d	41.60ab	41.26b
H_2SO_4 for 4 min.	21.10a	22.70a	43.36a	44.70a
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	17.20b	17.80b	42.3ab	41.76ab
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	17.00b	17.00c	43.30a	43.36a

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

3. Effect on chemical composition:

A. Total green color:

Results in Table (7) indicated that, a gradual increase in total green color in the leaves was observed with all pre-germination treatments over control in both seasons. In the first season the highest values were obtained from the treatment of soaking seeds in H_2SO_4 for 4 min., followed by the combination treatment of H_2SO_4 for 4 min. + GA_3 for 24 hrs as they gave 43.36 and 43.30 SPAD with non significant differences between them, while the control gave 37.80 SPAD. In the second one the corresponding significant values were 44.70 and 43.36 SPAD against 36.60 SPAD for the control .The stimulatory effect of acids was reported by Hegazi (2007) on *Calliandera haematocephala*.

B. Total phenols content:

Data recorded in Table (8) revealed that all pre-germination treatments lowered total phenols contents in the seed tissues when compared to control in both seasons. The least constituents resulted from the treatment of soaking seeds in H_2SO_4 for 4 min., followed by the combination treatment of H_2SO_4 for 4 min. + humic acid for 24 hrs as they gave 0.429 and 0.458mg/ g D.W., respectively in the first season against 1.104mg for control, while in the second one the corresponding values were 0.338 and 0.353 mg against 1.114mg/ g D.W. for the control. The obtained results showed that, all pre-germination treatments were effective in decreasing growth inhibitors represented by total phenols from seeds tissue .Growth and development were suggested to be a result of the balance between endogenous growth promoters and growth inhibitors. So phenolic compounds are main reason for growth inhibiting and decreasing such compounds in seeds stimulated seeds germination (Wareing and Suunders 1970). These results are in agreement with those obtained by Salama (1979) on *Melia azedrach,* Hussain (2003) on *Enterolobium cyclocarpum* and Hegazi (2007) on *Calliandra haematocephala.*

Table (8): Effect of some pre-germination treatments on total phenols content of *Thevetia nereifolia,* Juss. during 2007 and 2008 seasons.

Treatments	Total phenols (mg/g dry weight)	
	1st season	2nd season
Control (untreated seeds)	1.104a	1.114a
Tap water for 24 hrs.	0.849c	0.841c
GA_3 at 500 ppm for 24 hrs.	0.991b	0.879bc
GA_3 at 1000 ppm for 24 hrs.	0.774d	0.888b
Humic acid for 24 hrs.	0.777d	0.809d
H_2SO_4 for 2 min.	0.770d	0.567e
H_2SO_4 for 4 min.	0.429f	0.338g
H_2SO_4 for 4 min.+ humic acid for 24 hrs.	0.458f	0.353g
H_2SO_4 for 4 min.+GA_3 at 1000 ppm for 24 hrs.	0.667e	0.389f

Means within a column having the same letters are not significantly different according to Duncan,s Multiple Range Test.

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الملخص العربي
تاثير بعض المعاملات على انبات البذور ونمو الشتلات لشجيرة الثيفتيا

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أجريت هذه الدراسة في محطة البحوث الزراعية بسخا بمحافظة كفر الشيخ بمصر في الموسمين المتتاليين ٢٠٠٧ و٢٠٠٨ لبحث تأثير بعض معاملات ما قبل الإنبات على بذور الثيفتيا لمعرفة أنسب المعاملات لتحسين صفات الإنبات وانتاج شتلات جيدة، حيث عرضت البذور قبل زراعتها إلي ٩ معاملات هى النقع في حمض كبريتيك (٩٨,٥%) لمدة ٢ و٤ دقيقة و ماء الصنبور لمدة ٢٤ ساعة وحمض الجبريلليك بتركيز ٥٠٠ و ١٠٠٠ جزء في المليون لمدة ٢٤ ساعة وحمض الهيومك بتركيز ٣٠ مل في اللتر لمدة ٢٤ ساعة و خليط من حمض الكبريتيك لمدة ٤ دقائق+حمض الهيومك لمدة ٢٤ ساعة و خليط من حمض كبريتيك لمدة ٤ دقائق + حمض جبريلليك بتركيز ١٠٠٠ جزء في المليون لمدة ٢٤ ساعه وبذور بدون معاملة (كنترول).

وقد أمكن تلخيص النتائج المتحصل عليها كالتالي:

أعطت جميع معاملات ما قبل الإنبات زيادة معنويه فى كل من نسبة الإنبات و سرعة الإنبات ومعامل سرعة الإنبات وارتفاع النبات وعدد الأوراق على النبات وقطر الساق والمساحة الورقية وكذا الوزن الطازج والجاف للمجموع الخضري والجذري وطول الجذر ومحتوي الأوراق من اللون الاخضر بينما حدث نقص معنوي في متوسط معدل الإنبات ومحتوي البذور من الفينولات الكلية مقارنة بالكنترول في كلا الموسمين. ولهذا فإنه للحصول علي شتلات قوية و تحسين صفات الإنبات فإنه يجب نقع بذور الثيفتيا قبل الزراعه في حمض كبرتيك ٩٨,٥% لمدة ٤ دقائق او فى مخلوط منه مع اى من حمض الهيومك بتركيز ٣٠سم/ لترلمدة ٢٤ ساعه او حمض الجبريلليك بتركيز ١٠٠٠ جزء فى المليون لمدة ٢٤ ساعه.