Journal

J. Biol. Chem. Environ. Sci., 2010, Vol. 5(4):13-23
www.acepsag.org

# EFFECT OF SOME ROOTING PROMOTIVE AUXINS ON ROOTING OF DATE PALM (*PHOENIX DACTYLIFERA* L.) CV. ZAGHLOUL OFFSHOOTS UNDER NURSERY CONDITIONS

**Boshra A. El-Sayed[1]; Lobna M. Abdel-Galeil [2] and S.M. Shahin [3]**

[1]*Floriculture Res. Dept., Hort. Res. Inst., ARC, Giza, Egypt.*
[2]*Central Lab. for Res. & Date Palm Develop., Hort. Res. Inst., ARC, Giza, Egypt.*
[3]*Botanical Gars. Res. Dept., Hort. Res. Inst., ARC, Giza, Egypt.*

## ABSTRACT

A trial was established in the nursery of Hort. Res. Inst., Giza, Egypt during 2008/2009 and 2009/2010 seasons to fined out the effect of drenching soil mixture with either indole-3-butyric acid (IBA) or 1-Naphtaleneacetic acid (NAA) at the concentrations of 0, 500 and 1000 ppm for each, as well as their interactions, when applying three times with one month interval, on survival and rooting percentages, growth and chemical composition of date palm (*Phoenix dactylifera* L.) cv. Zaghloul offshoots planted in 50-cm-diameter plastic bags filled with about 35 kg of a sand + clay mixture (2:1, v/v) under nursery conditions.The obtained results indicated that survival and rooting percentages, root length (cm) and No. roots/offshoot were significantly increased as a result of applying either IBA or NAA at the different levels used in this study, except for NAA at the rates of 500 and 1000 ppm which gave survival (%) closely near together with non-significant differences among of them in both seasons. Rooting efficiency index (%) was also increased in progressive manner with increasing the rate of IBA, but the opposite was the right regarding NAA. Vegetative growth and chemical composition; expressed as leaf length (cm), No. new formed leaves/offshoot, fresh and dry weights (g) of these new leaves, as well as their content of N, P and K (%), were greatly improved in response to treatment with either IBA or NAA at various levels. However, the mastery in all previous parameters was for the combined treatment between IBA and NAA at

1000 ppm for each, as this combination registered the highest records at all.

Hence, we recommend applying such combined treatment for obtaining better results accompanied with the least percent of offshoots loss under nursery conditions.

## INTRODUCTION

*Phoenix dactylifera* L., Date Palm, that belongs Fam. Palmae, is considered a common fruit grown in tropical and subtropical areas. It is a dioecious feather palm, up to 30 m high with a solitary trunk. Every part of the plant is utilized, chiefly its delicious fruits. Date palms are intimately connected with the Egyptian landscape, as the trees grow in everywhere (El-Hadidi and Bolous, 1979).

Propagation of date palm by offshoots is still one of the main ways for production such crop on commercial scale, but it is hidered by two problems; firstly is the limited number of these offshoots produced by each palm tree, secondly is the high mortality rate in these offshoots when separated from the mother tree and translocate to the nursery for rooting (Corner, 1966). Auxins, however as a class of phytohormones are involved in many aspects of plant growth and development, mainly the induction of root primordials (Davies, 1995). Rizk and El-Sayed (2004) mentioned that the easiness and difficulty in rooting of date palm offshoots is correlated with their content of endogenous auxins. So, it is recommended to use auxins, alone or in combination, exogenously for rooting of date palm cultivars hard-to-root.

In this regard, El-Hodairi *et al.,* (1998) found that injection soil with NAA at 50 ppm gave the best rooting (%) and the highest number and length of roots in Taaghiyaat date palm offshoots. Saidi *et al.,* (1993) reported that dipping Jihel date palm offshoots weight from 0.2 to 1 kg in aqueous solution of IAA, IBA, NAA, kinetin, adenine and $GA_3$ for one hour befor planting in plastic bags filled with a sandy soil gave 28-71% rooting, while for offshoots weight 2 to 7 kg gave 80% rooting. The transplantation of rooted offshoots with its soil gave 100% survival. Moreover, treating Mejhoul date palm offshoots with 5-7% IBA increased survival and rooting percentages, as well as number of leaves (Qaddoury and Amssa, 2004). Likewise, treating

sewy date palm offshoots weighting 5-10 kg with IBA at 3000 ppm increased survival and rooting percentages and No. roots/offshoot.

On the same line, were those results of Bekheet and Saker (1998) and Taha *et al.,* (2001) on Zaghloul date palm, Haggag *et al.,* (2004) on Zaghloul and Samany date palm, Ruter *et al.,* (2004) on *Ficus benjamina*, Song *et al.,* (2006) on *Thuja koriaensis* and El-Fouly *et al.,* (2009) who confirmed that treating *Ficus deltoidea* cuttings with the combination of 6000 ppm NAA + 100 ppm BA significantly increased rooting (%), No. roots/cutting, root length and the rooting efficiency index (REI %).

Such trial, however aims to rising the rooting percentage of Zaghloul date palm offshoots under nursery conditions using some rooting-promotive auxins, consequently reduce the percent of loss..

## MATERIALS AND METHODS

An investigation was consummated in the open field at the nursery of Hort. Res. Inst., Giza, Egypt during the two consecutive seasons of 2008/2009 and 2009/2010 to study the effect of some rooting promotive auxins, alone or in combination, on rooting, growth and chemical composition of Zaghloul date palm offshoots under nursery conditions.

Therefore, good health and strong offshoots of date palm (*Phoenix dactylifera* L.) soft cultivar Zaghloul with about 46.0 cm circumference at the base and carry about 6 leaves, were carefully separated from adult trees grown at Giza Governorate. Adventitious roots, older leaves and other external tissues were carefully removed from the selected offshoots and the apical meristem was surrounded by the left leaves by tieing them together with a rope. Afterwards, offshoots were dipped in a 0.5% solution of Topsin-M, 70% WP (Sumitomo Chemical Co., Ltd, Osaka, Japan) for 30 minutes, and then planted on April, 15$^{th}$ for both studied seasons in 50-cm-diameter plastic bags (one offshoot/bag) filled with about 35.0 kg of sand+clay soil mixture (2:1, by volume). Some physical and chemical properties of the used soil mixture were determined according to the standard methods described by Richards (1954) and illustrated in Table (1).

**Table (1): Some physical and chemical properties of the used soil mixture in the two seasons.**

| Season | Particle size distribution (%) | | | | S.P. | pH | E.C. (ds/m) | Cations (meq/L) | | | | Anions (meq/L) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse sand | Fine sand | Silt | clay | | | | $Ca^{++}$ | $Mg^{++}$ | $Na^{+}$ | $K^{+}$ | $HCO_3^{-}$ | $Cl^{-}$ | $SO_4^{--}$ |
| 2008/09 | 67.02 | 7.48 | 11.80 | 13.70 | 25.86 | 7.63 | 4.51 | 24.12 | 10.00 | 36.55 | 1.56 | 3.60 | 25.16 | 43.47 |
| 2009/10 | 65.70 | 9.50 | 10.27 | 14.53 | 26.03 | 7.58 | 4.13 | 25.71 | 9.38 | 37.21 | 1.42 | 3.48 | 24.33 | 45.91 |

After one week from planting, the cultivated offshoots were irrigated with 8 liters of fresh water/bag, while after another week (at the end of April), they were subjected to the following treatments:

1- Indole-3-butyric acid (IBA, 98%, MP 124-125.5ºC, MW 203.24) product from Aldrich Chemical Co., Ltd., Gillingham, Dorset-England, and 1-Naphthaleneacetic acid (NAA, 98%, MP 126-133.5ºC, MW 186.21) product from Sigma Chemical Co., USA were added as a soil drench, 3 times with one month interval at the rates of 0, 500 and 1000 ppm for each.

2- IBA and NAA interaction treatments, as each level of IBA was combined with each one of NAA to form 9 interaction treatments.

The layout of the experiment in the two seasons was a complete randomized design in factorial experimental type (Mead *et al.,* 1993), with 3 replicates, as each one contained 3 offshoots. The usual agricultural practices recommended for such plantation were followed whenever needed.

At the terminal of October in the second year of each season, the following data were recorded: survival (%), rooting (%) from the present equation: Rooting (%)= R/Tx100 (where R: Number of rooted offshoots and T: Total number of offshoots in the treatment), root length (cm), number of roots/offshoot, length of the first new formed leaf (cm), number of the new formed leaves/offshoot, as well as fresh and dry weights of the new formed leaves (g). Moreover, the rooting efficiency index (REI %) was calculated as described by Ruter *et al.,* (2004) from the following equation:

**REI (%)** = Mean root length of the treated offshoot/Mean root length of untreated one x 100.

In dry leaf samples, the percentages of N, P and K were determined according to the methods indicated by Jackson (1973).

The data were then tabulated and SAS program (1994) was used for statistical analysis, whereas Duncan's Multiple Range Test (1955) was employed to verify the differences among the means of various treatments.

## RESULTS AND DISCUSSION

**Effect of IBA, NAA and their interactions on:**

**1- Survival (%) and rooting parameters:**

Data in Tables (2 and 3) clear that survival and rooting percentages, root length (cm) and No. roots/offshoot were significantly increased in the two seasons as a result of applying either IBA or NAA treatments used in the study, except for NAA at the rates of 500 and 1000 ppm, which gave survival percentages closely near together with non-significant differences in both seasons. However, the prevalence in the first and second seasons was for the combined treatment between the highest levels (1000 ppm) of both IBA and NAA, as this combination gave, in general the utmost high means in the two seasons compared to control and all other treatments.

As for rooting efficiency index (REI %), as a real indicator for strength of rooting, it was gradually increased with increasing the rate of IBA. The opposite was the right concerning NAA treatments, which caused a progressive decrement in the means of such measurement with rising the rate of application. However, the highest percentage of REI was due to 1000 ppm IBA treatment in the absence of NAA (00.00 ppm), which recorded 153.99 and 193.91% in the first and second seasons, respectively.Improving the previous parameters may explain the role of auxins in encouragement of the cambium cells, besides some other meristematic cells (especially parenchyma cells) for division and enlargement on the base of offshoots covered with the soil mixture to form adventitious roots (Davies, 1995). Thorre (1981) postulated that auxin, alone or with a very low concentration of cytokinin is important for the induction of root primordial. This was emphasized by Vuylasteker et al., (1998) who stated that the most reproducible and significant changes occurring after the application of NAA was a decrease in the level of zeatine-O-glucoside conjugates. Hydrolysis of these conjugates might deliver free zeatine-type

compounds which were consumed during the lateral roots growth, and disappear afterwards. These findings, however are in accordance with those postulated by Saidi et al., (1993) on Jihel date palm, Taha et al., (2001) on Zaghloul date palm, Haggag et al., (2004) on Zaghloul and Samany date palm, Song et al., (2006) on Thuja and El-Fouly et al., (2009) on F. deltoidea.

**Table (2): Effect of rooting promotive auxins and their interactions on survival and rooting percentages of *Phoenix dactylifera* L. cv. Zaghloul offshoots during 2008/09 and 2009/10 seasons.**

| treatments (ppm) | Survival (%) | | | | Rooting (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean |
| | First season: 2008/09 | | | | | | | |
| 0.0 IBA | 30.67 d | 60.00 bc | 63.33 bc | 51.33 c | 56.33 e | 66.00 ed | 67.67 ed | 63.33 c |
| 500 IBA | 56.33 c | 75.00 ab | 80.33 ab | 70.55 b | 70.66 d | 76.10 c | 83.60 b | 76.79 b |
| 1000 IBA | 80.34 ab | 78.33 ab | 85.90 a | 81.52 a | 77.00 c | 83.00 b | 89.33 a | 83.11 a |
| Mean | 55.78 b | 71.11 a | 76.52 a | | 68.00 c | 75.03 b | 80.20 a | |
| | Second season: 2009/10 | | | | | | | |
| 0.0 IBA | 33.46 f | 63.33 ed | 67.00 d | 54.60 c | 58.56 f | 68.33 e | 70.30 ed | 65.73 c |
| 500 IBA | 58.33 e | 76.31 c | 85.33 a | 73.32 b | 73.48 d | 79.00 c | 86.50 b | 79.66 b |
| 1000 IBA | 81.67 b | 86.10 a | 87.76 a | 85.18 a | 80.10 c | 86.31 b | 92.58 a | 86.33 a |
| Mean | 57.82 b | 75.25 a | 80.03 a | | 70.71 c | 77.88 b | 83.13 a | |

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

**Table (3): Effect of rooting promotive auxins and their interactions on root length and number and rooting efficiency of *Phoenix dactylifera* L. cv. Zaghloul offshoots during 2008/09 and 2009/10 seasons.**

| Hormone treatments (ppm) | Root length (cm) | | | | Root number/ offshoot | | | | Rooting efficiency index (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean |
| | First season: 2008/09 | | | | | | | | | | | |
| 0.0 IBA | 9.52 h | 11.83 g | 12.93 f | 11.43 c | 4.33 f | 9.00 e | 11.17 d | 8.17 c | 100.00 e | 100.00 e | 100.00 e | 100.00 c |
| 500 IBA | 13.18 f | 15.23 d | 16.20 c | 14.87 b | 16.00 c | 17.67 bc | 18.67 b | 17.44 b | 138.45 c | 128.74 d | 125.29 d | 130.83 b |
| 1000 IBA | 14.66 e | 17.00 b | 17.67 a | 16.44 a | 16.67 c | 19.17 b | 21.67 a | 19.17 a | 153.99 a | 143.70 b | 136.66 c | 144.78 a |
| Mean | 12.45 c | 14.69 b | 15.60 a | | 12.33 c | 15.28 b | 17.17 a | | 130.81 a | 124.15 b | 120.65 c | |
| | Second season: 2009/10 | | | | | | | | | | | |
| 0.0 IBA | 11.00 h | 13.83 g | 15.33 f | 13.39 c | 4.67 g | 10.00 f | 12.00 f | 8.89 c | 100.00 e | 100.00 e | 100.00 e | 100.00 c |
| 500 IBA | 18.17 e | 22.00 cd | 24.33 b | 21.50 b | 16.33 e | 21.00 d | 28.00 b | 21.78 b | 165.18 c | 159.08 d | 158.71 d | 160.99 b |
| 1000 IBA | 21.33 d | 23.33 bc | 26.67 a | 23.78 a | 18.67 de | 24.33 c | 32.33 a | 25.11 a | 193.91 a | 168.69 c | 173.97 b | 178.86 a |
| Mean | 16.83 c | 19.72 b | 22.11 a | | 13.22 c | 18.44 b | 24.11 a | | 153.03 a | 142.59 b | 144.23 b | |

* Means within a column or row having the same letters are not significantly different at 5% level.

## 2- Vegetative growth:

From data averaged in Tables (4 and 5), it could be concluded that leaf length (cm), No. new formed leaves/offshoot and their fresh and dry weights (g) were significantly increased in the two seasons as a result of treating with either IBA or NAA, with the exception of No. new formed leaves/offshoot character in the first season, in which the rate of increment was non-significant. Also, there was non-significant differences between the medium and high concentrations of either IBA or NAA (500 and 1000 ppm, respectively) in all previous parameters, except fresh and dry weight (g) of new formed leaves in the second season as the high concentration of NAA (1000ppm) showed the high significant diffrence compared with the medim concentration (500ppm) although the high concentration gave to somewhat higher values than the medium one in most cases of the two seasons. In general, the superiority in the measurments stated before was found due to the combination of 1000 ppm IBA + 1000 ppm NAA, which registered the highest records in most cases of both seasons. This may attributed to the synergistic effect of both auxins, as promotive agents necessary for accelerating growth and development of plant tissues (Davies, 1995).

However, these gains are similar to those of El-Hodairi *et al.,* (1998) on Taaghiyaat date palm, Bekheet and Saker (1998) on Zaghloul date palm, Qaddoury and Amssa (2004) on Sewy date palm and Ruter *et al.,* (2004) on *F. benjamina.*

**Table (4): Effect of rooting pronotive auxins and their interactions on leaf length and number of new formed leaves/offshoot of *Phoenix dactylifera* L. cv. Zaghloul offshoots during 2008/09 and 2009/10 seasons.**

| Hormone treatments (ppm) | Leaf length (cm) | | | | No. new formed leaves/offshoot | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean |
| | First season: 2008/09 | | | | | | | |
| 0.0 IBA | 27.83 e | 36.67 de | 45.00 cd | 36.30 b | 1.67 a | 2.33 a | 1.67 a | 1.89 a |
| 500 IBA | 46.00 cd | 68.33 ab | 74.67 a | 63.00 a | 1.67 a | 2.00 a | 2.00 a | 1.89 a |
| 1000 IBA | 47.33 cd | 71.00 a | 64.33 bc | 60.89 a | 2.00 a | 2.33 a | 2.00 a | 2.11 a |
| Mean | 40.39 b | 58.67 a | 61.33 a | | 1.78 a | 2.22 a | 1.89 a | |
| | Second season: 2009/10 | | | | | | | |
| 0.0 IBA | 26.33 d | 41.33 cd | 56.00 bc | 41.22 b | 1.67 c | 2.67 abc | 2.00 bc | 2.11 b |
| 500 IBA | 46.67 cd | 70.96 ab | 66.33 ba | 61.32 a | 2.00 bc | 3.00 ab | 3.33 a | 2.78 a |
| 1000 IBA | 50.56 c | 76.33 a | 68.90 ab | 65.26 a | 2.33 abc | 3.33 a | 3.33 a | 3.00 a |
| Mean | 41.19 b | 62.87 a | 63.74 a | | 2.00 b | 3.00 a | 2.89 a | |

* Means within a column or row having the same letters are not significantly different at 5% level

**Table (5): Effect of rooting promotive auxins and their interactions on fresh and dry weights of new formed leaves *Phoenix dactylifera* L. cv. Zaghloul offshoots during 2008/09 and 2009/10 seasons.**

| Hormone treatments (ppm) | Fresh weight (g) | | | | Dry weight (g) | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean |
| | First season: 2008/09 | | | | | | | |
| 0.0 IBA | 65.50 c | 68.53 bc | 65.98 c | 66.67 b | 32.68 c | 34.25 bc | 33.00 c | 33.31 b |
| 500 IBA | 72.38 ab | 73.35 ab | 74.67 ab | 73.46 a | 36.10 ab | 36.68 ab | 37.31 ab | 36.70 a |
| 1000 IBA | 73.33 ab | 73.56 ab | 78.13 a | 75.01 a | 36.67 ab | 36.80 ab | 39.10 a | 37.52 a |
| Mean | 70.40 b | 71.82 a | 72.93 a | | 35.15 b | 35.91 a | 36.47 a | |
| | Second season: 2009/10 | | | | | | | |
| 0.0 IBA | 64.78 d | 68.73 cd | 65.60 d | 66.37 b | 32.31 d | 34.35 cd | 32.80 d | 33.15 b |
| 500 IBA | 69.41 cd | 72.78 bc | 78.00 a | 73.40 a | 34.63 cd | 36.40 bc | 38.91 a | 36.65 a |
| 1000 IBA | 75.00 ab | 72.52 bc | 79.30 a | 75.60 a | 37.39 ab | 36.62 bc | 39.68 a | 37.90 a |
| Mean | 69.73 b | 71.34 b | 74.30 a | | 34.78 b | 35.79 b | 37.13 a | |

* Means within a column or row having the same letters are not significantly different at 5% level.

### 3- N, P and K content in the new formed leaves:

According to data presented in Table (6), it was obvious that, the percentages of N, P and K in the new formed leaves of treated offshoots were progressively increased in both seasons with elevating the concentration of either IBA or NAA to reach maximum at the high level of both auxins (1000 ppm). However, the interaction between IBA at 1000 ppm and NAA at the same concentration gave the utmost high content of the three nutrient elements compared to other interaction treatments. As mentioned before in case of vegetative growth, non-significant differences were observed among the means recorded by either medium (500 ppm) or high (1000 ppm) concentration of IBA, although the high concentration gave higher content than the medium one in the two seasons.

Similarly, were those results revealed by Taha *et al.,* (2001) on Zaghloul date palm, Haggag *et al.,* (2004) on Zaghloul and Samany date palm and Song *et al.,* (2006) on *Thuja koriaensis.*

From the aforementioned results, it could be recommended to treat *Phoenix dactylifera* L. cv.date palm Zaghloul offshoots cultivated in 50-cm-diameter with both IBA and NAA at 1000 ppm for each, three times with one month interval in order to obtain higher survival and rooting percentages accompanied with better growth under the conditions of nursery.

**Table (6): Effect of rooting hormones and their interactions on N, P and K content in the new formed leaves of *Phoenix dactylifera* L. cv. Zaghloul offshoots during 2008/09 and 2009/10 seasons.**

| Hormone treatments (ppm) | N (%) | | | | P (%) | | | | K (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean | 0.0 NAA | 500 NAA | 1000 NAA | Mean |
| | First season: 2008/09 | | | | | | | | | | | |
| 0.0 IBA | 2.53 c | 2.89 bc | 3.17 b | 2.86 b | 0.297 d | 0.336 cd | 0.357 c | 0.330 b | 1.32 d | 1.57 c | 1.97 b | 1.62 b |
| 500 IBA | 2.97 bc | 3.46 a | 3.40 a | 3.28 a | 0.340 cd | 0.433 b | 0.503 a | 0.425 a | 1.39 d | 1.99 b | 2.38 ab | 1.92 a |
| 1000 IBA | 3.38 ab | 3.77 a | 3.86 a | 3.67 a | 0.367 c | 0.450 b | 0.537 a | 0.451 a | 1.56 c | 2.33 ab | 2.76 a | 2.22 a |
| Mean | 2.96 b | 3.37 a | 3.48 a | | 0.335 c | 0.406 b | 0.466 a | | 1.42 c | 1.96 b | 2.37 a | |
| | Second season: 2009/10 | | | | | | | | | | | |
| 0.0 IBA | 2.41 d | 2.76 cd | 3.10 b | 2.76 b | 0.316 d | 0.336 d | 0.348 c | 0.333 b | 1.30 d | 1.50 c | 2.00 b | 1.60 b |
| 500 IBA | 2.86 c | 3.20 ab | 3.61 a | 3.22 a | 0.358 c | 0.401 b | 0.500 a | 0.420 a | 1.43 cd | 1.89 bc | 2.36 ab | 1.89 a |
| 1000 IBA | 3.27 ab | 3.50 a | 3.78 a | 3.52 a | 0.381 bc | 0.450 b | 0.551 a | 0.461 a | 1.62 c | 2.28 ab | 2.59 a | 2.16 a |
| Mean | 2.85 b | 3.15 ab | 3.50 a | | 0.352 c | 0.396 b | 0.466 a | | 1.45 c | 1.89 b | 2.32 a | |

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

# REFERENCES


Bekheet, S.A. and M.M. Saker (1998) *In vitro* propagation of Egyptian date palm (*Phoenix dactylifra* L.) cv. Zaghloul. 1st Inter. Conf. on Date Palms, Al-Ain, United Arab Emirates.

Corner,D.J.H.(1966):The natural history of palms.University of California press, Berkeleley and LosAngeles PP.1-393

Davies, P. J. (1995) Plant Hormones Physiology: Biochemistry and Molecular Biology. Kluwer Academic Publisher, Dordrecht, Netherlands, pp. 206-211.

Duncan, D.B. (1955) Multiple range and multiple F-tests. J. Biometrics, 11:1-42.

El-Fouly, S.Amal; H. Abdel-Fattah, Gehan and M.Y.A. Abdalla (2009) Rooting semi-hardwood stem cuttings of *Ficus deltoidea* Jack plant. J. Agric. Sci., Mansoura Univ., 34(2):1107-1120.

El-Hadidi and Bolous.(1979): Interaction effects of the sequential applications of some growth regulators on the growth of date palm tree(phoenix dactyliferaL.First international conference on date,Al-Ain,ArabEmirates,78-84 .

El-Hodairi, M.H.; A. Albahi; S.B. Ibrahim and M.A. Hamza (1998) Interaction effects of the sequential applications of some growth regulators on the growth of date palm trees (*Phoenix dacylifera*

L.). 1st Inter. Conf. on date palms. Al-Ain, United Arab Emirates:78-84.

Haggag, M.N.; A.M. Ibrahim; M.B. El-Sabrout and A.M. El-Assar (2004) Effect of cultivars and explants on the growth of the *in vitro* cultured tissues of two date palm cultivars. 2nd Inter. Conf. on date palms, Al-Ain, United Arab Emirates, 448-458.

Jackson, M.L. (1973) Soil Chemical Analysis. Prentice-Hall of India Private Limited M-97, New Delhi, India, 498 pp.

Mead, R.; R.N. Curnow and A.M. Harted (1993) Statistical Methods in Agriculture and Experimental Biology, 2nd Ed., Chapman & Hall Ltd., London, 335 pp.

Qaddoury, A. and M. Amssa (2004) Effect of exogenous indole butyric acid on root formation and peroxidase and $I_3AA$ oxidase activities and phenolic contents in date palm offshoots. Botanical Bull. Academia Sinica, 45(2):127-131.

Richards, L.A. (1954) Diagnosis and Improvement of Saline and Alkali Soils. USDA, Handbook No. 60.

Rizk, S.A. and O.M. El-Sayed (2004) Physiological studies on rooting ability of offshoots of some date palm cultivars. Egyptian J. Desert Res., 54(1):177-185.

Ruter, J.M.; E.K. Blythe; A.J. Sibley and K.M. Tilt (2004) Auxin application to stem cuttings of selected woody landscape plants by incorporation into a stabilized organic rooting substrate. J. Environ. Hort., 22(2):63-70.

Saidi, M.; K.H. Assarry and M. Allawy (1993) Rooting of small offshoots by mist system. Proc. of the 3rd Symp. on date palm in Saudi Arabia:189-196.

SAS Institute (1994) SAS/STAT User's Guides Statistics. Vers. 6.04, 4th Ed., SAS Institute Inc., Cary, N.C., USA.

Song, J.H.; J.J. Lee; Y.B. Koo; K.Y. Lee; S.D. Han and B.H. Yang (2006) Propagation by cutting method of Korea rare endemic *Thuja koraiensis* Nak. J. Korean Forest. Soc., 95 (4):393-397.

Taha, H.S.; S. A. Bekheet and M.M. Saker (2001) Factors affecting *in vitro* multiplication of date palm. Biologia Plantarum, Inst. Exper. Botany, 44(3):431-433.

Throrre, T.A. (1981) Plant Tissue Culture Methods and Application in Agriculture. 1st Ed., Academic Press, New Yourk, pp. 45-60.

Vuylsteker, C.; E. Prinsen; J. Boutin; H. Onckelen and S. Rambour (1998) Evidence for nitrate reductase expression during initiation of lateral roots by NAA in chicory. J. Exp. Bot., 49(323):937-944.

## تأثير بعض الآو كسينات المنشطة للتجذير على تجذير فسائل نخيل البلح (صنف الزغلول) تحت ظروف المشتل

**بشرة عبد الله السيد [١] ، لبنى محمد عبد الجليل [٢] و سيد محمد شاهين[٣]**

[١]قسم بحوث الزينة، معهد بحوث البساتين، مركز البحوث الزراعية، الجيزة، مصر
[٢]المعمل المركزي للأبحاث و تطوير نخيل البلح، معهد بحوث البساتين، مركز البحوث الزراعية، الجيزة، مصر
[٣]قسم بحوث الحدائق النباتية، معهد بحوث البساتين، مركز البحوث الزراعية، الجيزة، مصر

أجريت هذه الدراسة بمشتل معهد بحوث البساتين، الجيزة، مصر خلال موسمي ٢٠٠٨/٢٠٠٩، ٢٠٠٩/٢٠١٠ و ذلك لدراسة تأثير الإضافة الأرضية لإندول حمض البيوتريك (IBA) و نفثالين حمض الخليك (NAA) بتركيزات: صفر، ٥٠٠ و ١٠٠٠ جزء في المليون (لكلٍ منهما على حدة)، و كذلك التفاعلات بينهما، عند إضافتها ثلاث مرات بفاصل شهر بين كل مرتين على النسبة المئوية للنجاح و التجذير، و كذلك النمو الخضري و التركيب الكيميائي لفسائل نخيل البلح (*Phoenix dactylifera* L.) صنف الزغلول الرطب و المنزرعة في أكياس بلاستيك قطرها ٥٠ سم و مملوءة بحوالي ٣٥ كجم من مخلوط الرمل و الطين (بنسبة ٢ : ١ حجماً) تحت ظروف المشتل.و لقد أوضحت النتائج المتحصل عليها أن النسبة المئوية للنباتات الحية، النسبة المئوية للتجذير، طول الجذر (سم) و عدد الجذور/فسيلة قد زادت معنوياً نتيجة لإضافة إندول حمض البيوتريك أو نفثالين حمض الخليك بالتركيزات المختلفة التي طبقت بهذه الدراسة، باستثناء نفثالين حمض الخليك الذي لم يظهر أى فرق معنوى عند أستخدامه بتركيزي ٥٠٠ ، ١٠٠٠ جزء في المليون فى كلى الموسمين ولقد زادت النسبة المئوية لمعامل كفاءة التجذير (REI%) بشكل متصاعد كلما زاد تركيز IBA، بينما العكس كان صحيحاً فيما يتعلق بتأثير NAA. و لقد تحسنت بدرجة كبيرة قياسات النمو الخضري و التركيب الكيميائي (ممثلة في: طول الورقة (سم)، عدد الأوراق الجديدة/ فسيلة، الوزن الطازج و الجاف لهذه الأوراق (جم)، و كذلك النسبة المئوية لعناصر النيتروجين، الفوسفور و البوتاسيوم) نتيجة للمعاملة بـ IBA أو NAA بالمستويات المختلفة. الا أن السيادة و التفوق في جميع القياسات السابقة كانت للمعاملة المشتركة بين أندول حمض البيوتريك (IBA) و نفثالين حمض الخليك (NAA) عند إضافتهما بتركيز ١٠٠٠ جزء في المليون لكل منهما على حده، حيث سجلت هذه المعاملة أعلى القيم في كلا الموسمين مقارنة بجميع المعاملات الأخرى.

و عليه، فإننا نوصي بتطبيق هذه المعاملة المشتركة للحصول على أفضل النتائج مصحوبة بأقل نسبة فقد في الفسائل تحت ظروف الإنتاج بالمشتل.