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Effect of IBA, rooting media and planting date on vegetative propagation of button wood tree (*Conocarpus erectus L.)*

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abstract

This work was carried out during the two successive seasons of 2010/2011 and 2011/2012at the Experimental Lathe House of Horticulture Dept., Faculty of Agric., Benha University, Kalubia Governorate, Egypt, to study the effect of IBA, rooting media and planting date as well as their combinations on rooting percentage, root number and fresh and dry weights of roots as well as root anatomical features of *Conocarpus erectus* L cuttings. The recorded data showed that: all tested concentrations of IBA statistically increased rooting percentage of conocarpus as compared with untreated cuttings in both seasons. However, the highest value of rooting percentage was gained by 3000 ppm IBA- treated cuttings. Using M_4 (sand + clay + peat moss + perlite) showed to be the most effective one for inducing the highest rooting percentage , followed in a descending order by M_2 (sand + clay + peat moss) in both seasons . Rooted conocarpus cuttings in July month significantly produced the highest values of rooting percentage, followed in a descending order by May then September months in both seasons. The combinations of July month statistically induced the highest values of rooting percentage, especially those received IBA at 3000 ppm and rooted in M_4 medium. IBA at either 2000 or 3000 ppm increased the root number of cuttings, with superiority of 2000 ppm as compared with untreated cuttings at both seasons. Using M_4 proved to be the most effective one for producing the highest number of roots/ cutting as well as their fresh and dry weights, followed by using M_3 in both seasons. Planting cuttings in May month induced the highest number of roots /cutting as well as their fresh and dry weights, followed in a descending order by July and March months in both seasons .The combination of May month registered the highest values of these parameters, especially those treated with IBA at either 2000 or 3000 ppm and rooted in M_4 medium. Moreover, most of the tested treatments affected the root anatomical features of conocarpus plants.

Key words: *Conocarpus erectus*, vegetative propagation, cuttings, rooting percentage and root anatomical features.

Introduction

The genus *Conocarpus* is composed of two species native of North America and shores of tropical America and Africa. The word Conocarpus means "conefruit", in reference to the cone like round fruits **(Elias, 1980).**

Conocarpus erectus L. (botton wood, sea mulberry, botton mangrove, green botton wood, gray mangrove, button bush) belongs to the Family *Combretaceae*. *Conocarpus erectus*.. Botton wood plant is alow- branching, multi-trunked, shrubby and evergreen tree. Leaves are evergreen, alternate, thick and leathery, with an entire margin, generally oval but variable to 4 inches long and 2 inches wide, green and glabrous above and below. The root system consists mainly of laterals and fine roots that are dark brown, weak and brittle and have a corky bark. The bark is gray or brown, furrowed, fibrous and moderately thin (about 8 mm). The inner bark is dark cream in colour. Stem wood is hard, heavy and strong. Branches and brittle twigs are slender, yellow-green, angled, flattened, or winged. **(Lilte and Wadswerth 1964; Pennington and Sarukhan 1968; Howard 1989; Liogier 1994; Nelson 1996 and Stevens et al. 2001).**

Botton wood is highly tolerant to full sun, sandy soil, salty conditions, air pollution , poor drainage, and drought. Botton wood is used also as an ornamental tree or shrub and in bonsai. Botton wood trees are tough and long- lasting in the landscape. It is used for seaside planting , as a hedge; shade tree, residential street tree, buffer strips around parking lots, specimen , side walk cutout (tree pit), median strip planting in the high way; …… etc **(Gilman and Watson, 1993).**

Vegetative Propagation is used in the horticultural nursery industry to mass- produce selected superior plants genotypes as cultivars **(Hartmann *et al.*, 1997).** The seasons of propagation during which the cuttings are taken varies from one species to another and has a great effect on rooting. In this respect, **Abou Dahab *et al.* (1975)** reported that the best time for planting cuttings of *Myrtus communis* was from November to December, while **Istas and Meneve (1980)** found that the best time for taking cuttings of *Magnolia seibodii* is mid-may .Also, many authors studied the effect of planting media on rooting of cuttings, in this concern **El-Gendy *et al.* (1995a)** using a mixture of sand + peat as a growing medium obtained improved rooting percentage of Pilea and Hedera plants., **Abo- Hassan *et al.* (1994)** found that the best rooting percentage of *Ficus infectoria* cuttings was obtained by using perlite + peat moss medium. Many experiments have been done in order to study the effect of growth substances on rooting percentage of stem cuttings. In this sphere**, El- Boraie (1998)** found that IBA at

4000 ppm gave the highest rooting percentage of terminal and sub terminal cuttings of *Jasminum sambac*. Root length, number and dry weight of roots increased with IBA treatments as compared with control. This study aimed to evaluate the feasibility of button wood cuttings to produce rooted seedlings.

Materials and methods

This study was carried out during 2010/2011 and 2011/2012 seasons at the nursery of Horticulture .Dept, Faculty of Agric., Benha Univ., Qalubia Governorate to study the effect of some different rooting media and IBA concentrations under different planting dates.

- Plant material : Soft wood cuttings of *Concarpus erectus* L. were used, the cuttings were collected on Jannuary, March, May , July, September and November for each season from certain mother trees of three years old trees, the cuttings were 7.8 cm long and about 2 mm diameter. The leaves of the cuttings were shortened, then the cuttings were disinfected with Rhizolex fungicide powder at 0.3% concentration , and were treated with the following IBA concentrations:

1- IBA at 0.0 mg/l (control) 2- IBA at 2000 mg/l 3- IBA at 3000 mg/l.

Each cutting was inserted in a 5 cm diameter plastic pot containing different rooting media as follows:

1- Sand + clay (v:v) 2- Sand + clay + peatmoss (v:v) 3- Sand + clay + pelite (v:v)

4- Sand + clay + peatmoss + perlite (v:v)

Each treatment was represented by three replicates and each replicate included 10 cuttings. All inserted cuttings were held in the greenhouse under tunnels and 60 days later the following data were recorded

A- Rooting percentage and number of roots /cuttings as well as their fresh and dry weights.

B-Anatomical study:

The samples of root were taken in May month and the samples were taken from all treatments including the control. The specimens were taken then killed and fixed in FAA (5ml. formalin, 5ml. glacial acetic acid and 90ml. ethyl alchohol 70%), washed in 50% ethyl alcohol, dehydrated in series of ethyl alchohol of 70,90,95 and 100%, infiltrated in xylene, embedded in paraffin wax with a melting point of 60-63C, sectioned to 20 microns in thickness **(Sass, 1951**), stained with the double stain method (fast green and safranin), cleared in xylene and mounted in Canada balsam (**Johanson, 1940)**. Sections were read to detect histological manifestation of noticeable responses resulted from other treatments. The prepared section were microscopically examined, counts and measurements (µ) were taken using a micrometer eye piece.

Statistical analysis

The obtained data were statistically analyzed using randomized complete split – split block design according to **Snedecor and Cochran (1989)**, planting dates occupied the main plot, the subplots were devoted for rooting media, while the sub subplots were employed for IBA concentrations. Means were compared using L.S.D test at 5% level

Results and Discussion

Effect of IBA, rooting media and planting date as well as their combinations on rooting percentage, root number as well as their fresh and dry weights/cutting and root anatomical features of *Conocorpus erectus* plants:

1- Rooting percentage

Data presented in Table (1) reveal that all tested concentrations of IBA statistically increased rooting percentage of conocarpus as compared with untreated cuttings in both seasons. However, the highest value of rooting percentage was gained by 3000 mg/l IBA- treated cuttings as it gave 58.76 and 57.71% , followed by 2000 mg/l IAB- treated cuttings which scored 51.81 and 52.00% in the first and second seasons, respectively.

As for the effect of rooting media , data in the same Table show that using M_4 (sand + clay + peatmoss + perlite) showed to be the most effective one for inducing the highest rooting percentage , followed in adescending order by M_2 (sand + clay + peat moss) in both seasons . On contrary, the lowest rooting percentage was recorded in by using M_1 (sand + clay), followed in ascending order by M_3 (sand + clay + perlite). This trend was true in both seasons of this study.

Considering the effect of planting date, data presented in Table (1) demonstrate that rooted conocarpus cuttings in July month significantly produced the highest values of rooting percentage as it gave 80.506 and 86.725%, followed in adescending order by May then September months in both seasons. On the reverse, the least rooting percentage was recorded in January month, followed in ascending order by November and March months. This trend was true in both seasons.

Regarding the interaction effect between IBA concentrations, rooting media and rooting dates, data presented in Table (1) declare that the combinations of July month statistically induced the highest values of rooting percentage; especially those received IBA at 3000 mg/l and rooted in M_4 medium as it gave 96.30 and 98.667% in the first and second seasons, respectively. Also, the cuttings which received IBA at 3000 mg/l and rooted in M_2 in July month gave high increments in this parameter as it registered 94.533 and 96.667%, in the first and second seasons, respectively. On the opposite, the combination of January month statistically scored the lowest values of rooting percentage, particularly those rooted in M_1 and received no IBA treatments in both seasons. The remained treatments occupied an intermediate

position between the aforementioned treatments in both seasons.

The aforementioned results of IBA treatments are in parallel with those obtained by **Helaly (2009)** on *Concarpus. erectus* , **Blithe (1990)** on *Cupressus glabra*, sundaram, *ouriculata*, **Teklehaimanot *et al* (1996)** on *Porkia biglobosa* , **El- Boraie (1998)** on *Jasminum sambac* .

The results of rooting media coincide with those obtained by **Helaly (2009)** on *Concarpus. erectus* , **Siraj- Ali and Abou- Dahab (1993)** on *Ficus benjamina*, **Abo- Hassan *et al* (1994)** on *Ficus infectoria*, **El- Gendy *et al* (1995a)** on Pillea and Hedera plant .

In addition the results of cutting date go on line with those obtained by **Helaly (2009)** on *Concarpus. erectus* , **Istas and Meneve (1980)** on *Magnolia seibodii*, **Popovic (1984)** on *Actinidia chinensis*, **Shen and Chen** (**1990**) on *Lcycim barbarum L.*, **Sawwan (1993)** on *Gypsophila panicullata*, **Singh (1993)** on Bougainvillea plants .

Table 1. Effect of IBA, rooting media and planting date as well as their combination on rooting percentage of *Conocarpus erectus* during the two successive seasons of 2010/2011 and 2011 2012.

Months / IBA(mg/l)	Media	Jan	Mar	. May	. July	Sep.	Nov.	Mean
0.0	M_1	8.333	25.133	45.233	63.400	38.300	14.633	36.47
	M_2	11.267	24.800	49.367	71.700	47.500	18.500	
	M_3	9.400	23.533	47.467	68.433	44.884	21.400	
	M_4	12.367	28.700	52.533	74.633	49.233	24.567	
2000	M_1	11.733	31.700	68.300	78.333	53.933	27.800	51.81
	M_2	12.533	36.633	84.800	88.433	69.233	2.833	
	M_3	13.367	34.833	76.400	83.567	67.133	29.567	
	M_4	14.433	39.467	87.467	91.600	74.467	34.933	
3000	M_1	14.200	38.633	74.600	62.333	70.333	36.467	58.76
	M_2	16.200	46.467	92.600	94.533	79.400	39.500	
	M_3	15.367	42.533	90.400	92.800	77.567	41.467	
	M_4	17.867	49.433	94.800	96.300	83.567	42.867	
Mean		13.089	35.156	71.997	80.506	62.963	30.378	
Means of media		M_1=42.410	M_2= 50.910	M_3=48.890		M_4=53.850		
LSD at 5%		IBA= 4.132	media=4.958		months= 6.446		interaction=9.668	
Second Season								
0.0	M_1	6.280	26.500	52.400	66.167	43.933	9.427	38.97
	M_2	9.477	29.467	4.833	76.300	58.533	12.567	
	M_3	8.267	28.467	63.500	73.500	49.467	11.410	
	M_4	9.767	29.767	69.467	78.533	52.567	14.667	
200.0 mg/l	M_1	8.733	29.400	73.867	82.600	69.533	12.367	52.00
	M_2	11.300	34.533	84.467	96.167	82.767	14.467	
	M_3	9.800	32.700	79.600	91.367	81.400	15.867	
	M_4	12.433	36.467	87.133	98.433	84.667	18.133	
3000 mg/l	M_1	11.363	39.467	81.633	85.400	74.467	18.367	57.71
	M_2	13.500	46.433	89.500	96.667	86.633	25.700	
	M_3	14.233	44.533	84.767	93.300	82.700	23.700	
	M_4	15.300	47.700	93.600	98.667	88.133	29.333	
Mean		10.871	35.453	77.064	86.425	70.400	17.167	
Means of media		M_1=43.990	M_2= 51.290		M_3=49.360		M_4=53.600	
LSD at 5%		IBA= 3.2	Media=3.941		Months=5.123		Interaction=7.684	

M_1= Sand + clay, **M_2=** Sand + clay + peatmoss, **M_3=** Sand + clay + perlite, **M_4=** Sand + clay + peatmoss + perlite

2- Root number

Data presented in Table (2) clear that IBA at either 2000 or 3000 mg/l increased the root number of *Conocarpus erectus* cuttings, with superiority for IBA in 2000 mg/l as compared with untreated cuttings at both seasons .The differences between the two used IBA concentrations were non-significant in both seasons. Regarding the effect of rooting media, data refer that using M_4 approved to be the most effective one for producing the highest number of roots/ cutting, followed by using M_3 in both seasons. On contrary, M_1 medium recorded the lowest number of roots /cutting is both seasons. As for the effect of planting date, data in show that planting conocarpus cuttings in May month induced the highest number of roots /cuttings, followed in adescending order by July then March months in both seasons .On the reverse, the lowest number of roots / cuttings were

scored in January and November months in both seasons.

Considering the interaction effect between IBA, rooting media and planting date, data presented in Table (2) indicate that the combination of May month registered the highest values of this parameter, especially those treated with IBA at 2000 mg/l and rooted in M_4 medium, whereas the combination of January and November months gave the lowest values in this concern, particularly those received no IBA treatments in both seasons. The rest treatments came in between in both seasons. These results are in agreement with those obtained by **Bhattacharjee and Thimmapaa (1991)** on *Pelargonium graveolens who* mentioned that the best results (100% rooting, 28.3 roots/ cutting and a longest root length of 19.3 cm) were obtained from treating with IBA at 2000 mg/l, **Eltorky and Shennawy, (1993b)** found that the cutting of cultivars of *Ficus deltoidea* **and** *Euphorbia pulcherrima* cuttings were treated with various concentrations of IBA. Generally root length was significantly increased due to IBA, **Panwar *et al.*, (1994)** reported that IBA at 2000 mg/l was the best treatment for increasing rooting percentage of *Bougairvillea* cuttings.

Table 2. Effect of IBA, rooting media and planting date as well as their combination on root number of *Conocarpus erectus* during the two successive seasons of 2010/2011 and 2011 2012.

Months		Jan	Mar.	May	July	Sept.	Nov.	Mean
IBA (mg/l)	Media							
0.0	M_1	8.133	10.433	12.500	12.400	11.45	9.333	11.597
	M_2	8.833	11.333	3.600	13.233	11.567	10.300	
	M_3	9.267	11.167	14.267	14.067	11.733	9.8	
	M_4	9.667	12.833	14.933	14.367	12.400	0.700	
2000	M_1	11.233	13.400	13.933	13.600	12.767	10.233	13.781
	M_2	13.667	14.267	14.933	14.433	13.900	11.300	
	M_3	14.167	14.933	15.633	15.300	14.233	11.933	
	M_4	14.933	15.333	16.233	15.867	14.533	12.367	
3000 mg/l	M_1	10.667	12.433	13.367	13.305	11.767	9.967	13.170
	M_2	11.867	13.233	14.233	14.333	12.667	11.333	
	M_3	12.367	14.600	15.500	15.233	13.800	11.267	
	M_4	13.100	14.867	15.733	15.467	13.867	11.100	
Mean		11.492	13.236	14.572	14.300	12.892	10.803	
Means of media	M_1=11.719	M_2= 12.72		M_3=13.293		M_4=13.794		
LSD at 5%	IBA= 1.140	media=1.368		months=1.778		Interaction=2.66		
Second Season								
0.0	M_1	7.800	9.800	12.867	12.733	9.633	8.433	11.199
	M_2	9.433	10.333	13.433	13.133	10.233	9.100	
	M_3	9.167	11.167	14.633	14.167	10.167	9.733	
	M_4	9.533	12.433	14.900	14.433	11.267	10.233	
2000	M_1	10.900	12.833	13.433	12.833	12.533	11.333	13.785
	M_2	12.167	14.533	14.267	13.867	13.000	12.533	
	M_3	13.967	14.367	15.933	15.467	13.633	12.933	
	M_4	14.367	15.033	16.633	15.833	14.000	14.433	
3000	M_1	10.533	12.600	13.567	12.467	12.133	11.333	13.200
	M_2	11.833	13.467	14.000	12.800	12.833	12.667	
	M_3	12.900	13.767	14.767	14.600	13.433	13.233	
	M_4	13.133	14.433	15.438	14.232	13.533	13.100	
Mean		11.311	12.897	14.489	13.881	12.200	11.589	
Means of media	M_1=11.543	M_2= 12.424		M_3=48.890		M_4=13.721		
LSD at 5%	IBA= 1.031	media= 1.236		months=1.601		Interaction=2.410		

M_1= Sand + clay, **M_2=** Sand + clay + peatmoss, **M_3=** Sand + clay + perlite, **M_4=** Sand + clay + peatmoss + perlite

3- Roots fresh and dry weights

Data presented in Tables (3&4) show that IBA at 2000 or 3000 mg/l increased the fresh and dry weights of *Conocarpus erectus* roots/cutting, with superiority for IBA at 3000 mg/l as compared with untreated cuttings in both seasons. The differences between the two used IBA concentration were non-significant in both seasons. Considering the effect of rooting media, data reveal that M_4 was the most effective one for giving the heaviest fresh and dry weights of roots/ cutting, followed by using M_3 in both seasons. On contrary, M_1 medium recorded the lowest values of these parameters in both seasons. As for the effect of planting date, data show that

planting conocarpus cuttings in May month induced the highest records of roots fresh and dry weights /cuttings, followed in adescending order by July then March months in both seasons .On the reverse, the lowest number of roots / cutting was scored in January and November months in both seasons.

Referring to the interaction effect between IBA, rooting media and planting date, data presented in Table (3) indicate that the combination of May month registered the highest values of this parameter, particularly those treated with IBA at 3000 mg/l and rooted in M_4 medium, whereas the combination of January and November months gave the lowest values in this respect, especially those received no IBA treatments in both seasons. The rest treatments came in between in both seasons. These results are agreement with those obtained by **Bhattacharjee and Thimmapaa (1991)** on *Pelargonium graveolens who* recorded that the heaviest fresh and dry weights of roots/ cutting were obtained from treating with IBA at 2000 mg/l., **Eltorky and Shennawy (1993a)** revealed that *Euphorbia pulcherrima* cuttings treated with various concentrations of IBA significantly increased the fresh and dry weights of roots/cutting . **Panwar *et al.*, (1994)** reported that IBA at 2000 mg/l, was the best treatment for producing the heaviest fresh and dry weights of *Bougairvillea* cuttings

Table 3. Effect of IBA, rooting media and planting date as well as their combination on roots fresh weight (g.) of *Conocarpus erectus* during the two successive seasons of 2010/2011 and 2011 2012.

Months / IBA(mg/l)	Media	Jan.	Mar.	May	July	Sept.	Nov.	Mean
0.0	M1	1.210	1.570	1.870	1.840	1.740	1.440	1.798
	M_2	1.320	1.750	2.110	2.060	1.810	1.83	
	M_3	1.430	1.730	2.210	2.190	1.840	1.520	
	M_4	1.490	1.980	2.350	2.290	1.930	1.640	
2000	M_1	1.790	2.150	2.290	2.200	2.100	1.650	2.295
	M_2	2.250	2.480	2.500	2.350	2.320	1.830	
	M_3	2.340	2.470	2.630	2.510	2.350	1.970	
	M_4	2.470	2.570	2.740	2.650	2.440	2.020	
3000	M_1	1.810	2.210	2.390	2.330	2.060	1.720	2.350
	M_2	2.060	2.360	2.620	2.540	2.290	1.960	
	M_3	2.180	2.680	2.910	2.720	2.440	1.960	
	M_4	2.340	2.690	2.960	2.750	2.470	1.960	
Mean		1.891	2.220	2.465	2.369	2.149	1.792	
Means of media		MI= 1.909	M_2= 2.136		M_3= 2.227		M_4=2.319	
LSD at 5%		IBA=0.232	Media= 0.278		Months=0.362		Interaction=0.542	
Second season								
0.0	M,	1.770	1.480	1.990	1.980	1.480	1.300	1.760
	M_2	1.420	1.590	2.070	2.110	1.590	1.390	
	M_3	1.410	1.73.	2.290	2.240	1.570	1.460	
	M_4	1.480	1.940	2.350	2.270	1.750	1.580	
2000	M!	1.790	2.120	2.230	2.150	2.070	1.870	2.289
	M_2	2.000	2.420	2.370	2.340	2.150	2.070	
	M_3	2.290	2.347	2.670	2.600	2.270	2.160	
	M_4	2.370	2.500	2.800	2.650	2.300	2.370	
3000	M,	1.830	2.200	2.400	2.200	2.140	1.970	2.348
	M_2	2.080	2.380	2.480	2.700	2.520	2.490	
	M_3	2.280	2.430	2.630	2.420	2.410	2.380	
	M_4	2.330	2.560	2.730	2.520	2.400	2.300	
Mean		1.921	2.143	2.417	2.313	2.054	1.945	
Means of media		M!= 1.943	M_2=2.097		M_3=2.201		M_4=2.289	
LSD at 5%		IBA=0.198	Media=0.237		Months= 0.308		Interaction=0.463	

MI= Sand + clay, M_2= Sand + clay + peatmoss, M_3= Sand + clay + perlite, M_4= and + clay + peatmoss + perlite

Table 4. Effect of IBA, rooting media and planting date as well as their combination on roots dry weight(g.) of concarpus erectus during the two successive seasons of 2010/2011 and 2011 2012.

Months		Jan	Mar.	May	July	Sept.	Nov.	Mean
IBA	Media							
0.0	Mi	0.130	0.170	0.210	0.210	0.190	0.160	0.196
	M_2	0.140	0.190	0.240	0.230	0.200	0.170	
	Ms	0.140	0.190	0.240	0.250	0.200	0.160	
	M_4	0.150	0.220	0.260	0.260	0.210	0.180	
2000	M,	0.180	0.240	0.250	0.240	0.230	0.180	0.253
	M_2	0.250	0.280	0.280	0.260	0.260	0.200	
	Ms	0.260	0.270	0.290	0.280	0.260	0.220	
	M_4	0.270	0.280	0.300	0.290	0.270	0.220	
3000	Mi	0.200	0.240	0.260	0.260	0.230	0.190	0.259
	M_2	0.230	0.260	0.290	0.280	0.250	0.220	
	Ms	0.240	0.290	0.320	0.300	0.270	0.210	
	M_4	0.260	0.300	0.330	0.300	.270	0.220	
Mean		0.204	0.244	0.272	0.263	0.237	0.194	
Means of media		M,= 0.209		M_2= 0.235		M_3= 0.244		M_4=0.255
LSD at 5%		IBA=0.018		Media= 0.0218		Months=0.028		Interaction=0.042
Second season								
0.0	Mi	0.210	0.180	0.240	0.240	0.180	0.160	0.211
	M_2	0.170	0.190	0.250	0.250	0.190	0.170	
	Ms	0.170	0.200	0.270	0.270	0.190	0.180	
	M_4	0.180	0.230	0.280	0.270	0.210	0.190	
2000	M!	0.210	0.250	0.270	0.260	0.253	0.220	0.274
	M_2	0.240	0.290	0.280	0.280	0.260	0.250	
	Ms	0.270	0.280	0.320	0.310	0.270	0.260	
	M_4	0.280	0.300	0.340	0.320	0.280	0.280	
3000	Mi	0.220	0.260	0.290	0.260	0.260	0.240	0.284
	M_2	0.250	0.290	0.300	0.270	0.300	0.300	
	Ms	0.270	0.290	0.320	0.290	0.290	0.280	
	M_4	0.280	0.350	0.330	0.300	0.290	0.280	
Mean		0.229	0.259	0.291	0.277	0.248	0.234	
Means of media		M1=0.233		M_2=0.252		M_3= 0.263		M_4=0.277
LSD at 5%		IBA= 0.014		Media=0.016		Months=0.022		Interaction=0.032

MI= Sand + clay, M_2= Sand + clay + peatmoss, M_3= Sand + clay + perlite, M_4= Sand + clay + peatmoss + perlite

4-On anatomical features

Data obtained on anatomical features of roots of *Conocarpus erectus* plants as affected by some treatments of IBA and planting media are shown in Fig(1) The different assigned treatments (M1a-M1c, M2a-M2c , M3a-M3c ,M4a-M4c) markedly affected the anatomical features of roots of the treated plants. Here, using M_4b (sand: clay: perlite: peat moss+ IBA at 2000 mg/l) gave the maximum values of root diameter, epidermal layer thickness, number of cortex layers and cortex layers thickness as compared with control. Whereas, the highest value of mean thickness of cortex layers was scored by M_3a (sand: clay: perlite+ IBA at 2000 mg/l), while the thickest vascular cylinder was obtained by M_4b (sand: clay: perlite: peat moss+ IBA at 3000 mg/l).Also, the highest number of vascular bundle in vascular cylinder was registered by M_1b (sand: clay + IBA at 2000 mg/l). Moreover, the highest values of thickness of xylem in vascular bundles, number of vessels in xylem bundle and thickness of widest xylem vessel were scored by M_1a (sand: clay), whereas, the highest phloem thickness was gained by M_1c (sand: clay + IBA at 3000 ppm).Furthermore, using M_4a (sand: clay: perlite: peat moss) recorded the highest value of paranchymatous pith thickness as compared with the other treatments.

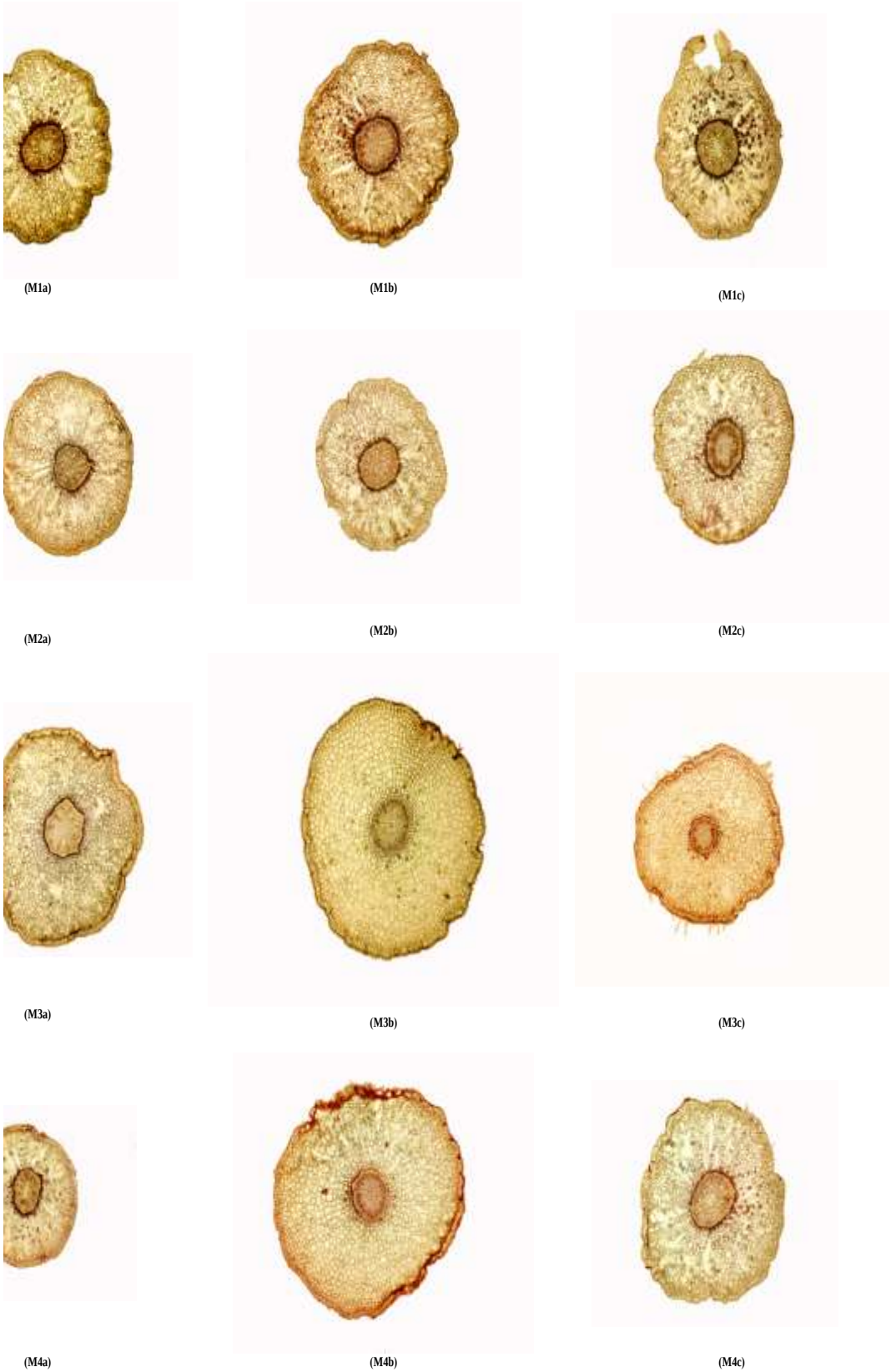

Fig (1): Transvers sections (X=40) through the root of *Conocarbus erectus* as affected by different applied treatments. Where: M1a (sand: clay☺, M1b (sand: clay + IBA at 2000 mg/L), Mic (sand: clay + IBA at 3000 mg/L), M2a(sand: clay: peat moss) , M2b(sand: clay: peat moss + IBA at 2000 ppm). M2c(sand: clay : peat moss + IBA at 3000 ppm), M3a (sand : clay : perlite), M3b (sand: clay:perlite+ IBA at 2000 mg/L). M3c(sand : clay : perlite+ IBA at 3000 mg/L), M4a(sand : caly: perlite: peat moss) M4b(sand: clay : perlite: peat moss + IBA at 2000 mg/L) and M4b(sand : clay: perlite: peat Moss + IBA at 3000 mg/L)

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تأثير إندول حمض البيوتريك وبيئات التجذير ومواعيد الزراعة على التكاثر الخضرى لشجيرة زرار الخشب ((*Conocarpus erectus* L.)

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قسم البساتين كليه الزراعه جامعه بنها

أجريت هذه التجربة خلال عامى 2011/2010 و 2012/2011 فى الصوبة الخشبية بقسم البساتين كلية الزراعة – جامعة بنها – محافظة القليوبية – مصر . وذلك لدراسة تأثير كل من معاملات الأندول حمض البيوتريك وبيئات التجذير ومواعيد الزراعة وتفاعلاتهم على نسبة تجذير وعددالجذور والوزن الطازج والجاف للجذور والصفات التشريحية لجذورعقل الكونوكارب لقد أوضحت النتائج الآتي :

أن جميع معاملات الإندول حمض البيوتريك قد حسنت نسبة التجذير بالمقارنة بالكنترول فى كلا الموسمين حيث تم الحصول على أعلى نسبة تجذير عن طريق استخدام معاملة الجذور بتركيز 3000 جزء فى المليون. كما وجد أن مخلوط البيئة المكون من رمل و طمى وبيت موس وبيرليت(1: 1: 1) حجما قد أعطى أعلى نسبة تجذير يليها فى ذلك البيئة المكونة من رمل وطمى وبيت موس(1: 1 :1) حجما فى كلا الموسمين – كما وجد أن زراعة عقل النبات فى شهر يوليو قد اعطى أعلى نسبة تجذير يليها فى ذلك شهر مايو وسبتمبر فى كلا الموسمين . وعلى العموم وجد أن أعلى نسبة تجذير قد تم الحصول عليها عند المعاملة بإندول حمض البيوتريك بتركيز 3000 جزء فى المليون والزراعة فى مخلوط بيئة مكون من رمل وطمى وبيت وبيرليت فى شهر يوليو.

أدى أستخدام اندول بيوتريك أسيد بتركيز 2000 و 3000 جزء فى المليون إلى الحصول على أعلى عدد من الجذور على العقل وكذلك أكبر وزن طازج وجاف للجذور.

كذلك أدى استخدام مخلوط البيئة المكون من رمل وطمى بيت وبيرليت إلى الحصول على أعلى عدد من الجذور المتكونة على العقل وكذلك أكبر وزن طازج وجاف للجذور يليها فى ذلك البيئة المكونة من رمل وطمى وبيت موس كما وجد أن زراعة عقل الكونوكاربس فى شهر مايو قد أعطت أكبر عدد من الجذور المتكونة على العقل وكذلك أكبر وزن طازج وجاف للجذور يليها فى ذلك شهرى يوليو ومارس فى كلا الموسمين وبصفة عامة وجد ان أعلى عدد من الجذور وكذلك أكبر وزن طازج وجاف للجذور قد تم الحصول عليها عند معاملة العقل بإندول حمض البيوتريك بتركيز 2000 و 3000 جزء فى المليون والزراعة فى البيئة رمل وطمى وبيت موس وبيرليت (1 :1: 1: 1)فى شهر مايو.أدت معظم المعاملات الى تأثيرات مختلفة فى الصفات التشريحية .