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Influence of planting Date and Different Growing Media on Rooting of Cutting of *Euphorbia milii* L. Plant

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ABSTRACT

The potting experiment was conducted during 2018/2019 and 2019/2020 seasons at the Experimental of Floriculture Farm, Department of Horticulture, Faculty of Agriculture, Benha University to find out the influence of planting date and the mixture of growing media on improving and enhancement of the root growth characteristics of *Euphorbia milii* cuttings. Results showed that growing *Euphorbia milii* cuttings in the autumn and amid a mixture containing clay +perlite +peat moss (1:1:1 v:v:v) produced the highest number of roots/ cutting, rooted cuttings /medium, root length / cutting, rooted cuttings percentage and number of leaves /cutting. followed by a mixture of clay + sand + peat moss + perlite (1:1:1;1 v:v:v:v) .Whereas clay+ perlite (1:1 v:v) in the autumn ranked the third value in this concern. Conclusively, growing of *Euphorbia milii* cuttings in a potting medium containing clay +perlite +peat moss in (autumn) produced the best rooting quality of *Euphorbia milii* cutting.

Keywords: *Euphorbia milii* , root cutting , growing media , perlite and Peat moss

INTRODUCTION

Euphorbia milii known as (Crown of Thorns, Christ plant and Christ-thorn) is one of the flowering succulent plants, and it belongs to the Euphorbiaceae family. However, Madagascar is the original home of the plant. It is a slow-growing plant with limited branching but is much esteemed for its brilliant flower-like inflorescences. It is a succulent plant, the height of the stem reaches from 5 to 6 feet, with woody stems of a grayish-brown color, which are branched and contain many prominent gray thorns. Also, the leaves are bright green to dark green, tending to gray, oval, with a smooth edge, and thick, arranged in a spiral shape. What appears as It is seems flowers are in fact inflorescences. Each one consists of a structure known as the cyathium. It consists of a flower resembling a cup and inside It consists of a female flower of very small size surrounded by three male flowers which are reduced to single stamens. This type is desirable for the beauty of the flowers, the continuation of their blooms and the strength of the plants. It can be planted throughout the year in dry areas with high temperatures and high solar radiation in potted, bedding, or garden plants Jankalski (2000). These qualities affect its use in different places in landscaping as a bed, pot, hedge plant, and even for indoor decoration. Some types of Euphorbia are used to treat certain diseases such as skin diseases, intestinal parasites, and warts.

The growing medium is one of the most important factors affecting the growth of ornamental plants, as many plants spend their life cycle in pots and require a medium that meets their different needs. These include sand, clay, perlite and peat moss. Clay is the plant's primary medium. It is easy to handle and available cheaply. Many soils are generally composed of 50% water and air, 46-49% various mineral particles, and 1-6% organic matter. The mineral particles of soil or sand range in diameter from 0.05 - 2 mm, while the diameter of silt grains is 0.002 - 0.05 mm. and clay less than 0.002 mm thick (Gohil *et al*., 2018). The soil is the main habitat for both producers (green plants) and (bacteria and fungi). While for most inorganic pollutants, water and air are self-purifying systems, the soil is a basin that is absorbed or filtered by the environment and has the ability to retain the natural water substances that enter it. Soil can also be considered as a recycling device in nature, providing home to many organisms and habitats created by humans, as well as acting as an engineering medium (Karlen *et al*., 1997). Sand that is used in the potting mix has an important effects .The naturally granular material is composed of very small particles of minerals and rocks. Silica (silicon dioxide, SiO_2.), mostly in the form of quartz, is the most common sand compound. It also helps to increase the possibilities of water retention as well as aeration, and it is also possible to use sand to increase the mixture in weight (Gohil *et al*., 2018). In addition, Perlite is a gray silicate volcanic rock origin, extracted from lava flows. It does not contain any herbs, as it is free from pathological pollutants, and helps to improve water drainage and aeration of the planting mixture. Its pH is mostly neutral. However, one of its biggest drawbacks is that the nutrients in it are very few, and its ability to exchange cations is very small (Gohil *et al*., 2018). Moreover, Peat moss is an amended soil and is known as a dark brown fibrous material that is used as a growing medium in which plants grow. It is often added to the soil to help lighten and ventilate it as well, as it helps to retain moisture. During the past 30 years, peat moss is known as the main component of the container substrate for greenhouse production (Wright *et al*., 2008).

The aim of this study was to estimate the influence of the planting date and growing media on rooting traits and quality of *Euphorbia milii* cuttings.

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MATERIALS AND METHODS

The Current investigation was carried out at the Experimental Farm, Department of Horticulture, Faculty of Agriculture, Benha University, Qalubia Governorate, Egypt, throughout the two consecutive seasons of 2018 /2019 and 2019 /2020 aiming to find out the influence of mixture of potting media (sand , clay, perlite and peat moss) mixtures on improving and enhancement the root growth characteristics of *Euphorbia milii* cuttings.

Plant Material

Terminal stem cuttings with a length of (10-15 cm) were taken from the plants purchased from Shimco Agricultural farm at Kafr Hakim Kerdasa Giza, Egypt A selected uniform terminal cuttings of *Euphorbia milii* were taken and left in dry place for a week until the milky liquid was dried. Then any leaves or flowers on it were removed. The culturing process were performed throughout the 15th of September and March during both seasons of 2018/2019 and 2019/2020, respectively. Then, the well dried terminal cuttings bases were dipped in naphthaleneacetic acid (NAA) solution at a concentration of 1000 ppm for 5 second then planted in 10 cm plastic pots filled with ten different mixtures of potting media (v: v) as follows.

1-sand 2- sand +clay 1:1
3- sand +peat moss 1:1 4- sand + perlite 1:1
5- clay + perlite 1:1 6- peat moss + perlite 1:1
7- sand + clay + peat moss 1:1:1
8- sand + clay + perlite 1:1:1
9- clay + peat moss+ perlite 1:1:1
10- sand +peat moss + clay + perlite 1:1:1:1

The physical and chemical analysis of the media used is shown in Table (1)

Table 1. Physical and Chemical analysis characteristics of the ten chosen growing media.

Media	pH	EC ($dS.m^{-1}$)	Organic matter (%)	Available nitrogen (mg/Kg)	Available phosphorus (mg/Kg)	Available potassium (mg/Kg)
Sand	7.3	0.66	1.10	2210	310	420
Sand +clay	7.5	1.18	1.42	3644	510	722
sand +peat moss	6.4	1.16	1.99	4466	580	780
sand +perlite	7.1	0.99	1.66	3878	530	660
perlite +peat moss	6.6	1.10	3.88	6284	680	790
perlite +clay	7.10	0.96	2.50	5125	650	760
clay +perlite +sand	7.1	1.30	2.33	4050	530	620
clay+ perlite +peat moss	6.5	0.96	3.25	5125	650	866
clay +sand +peat moss	6.8	1.30	2.33	3878	530	780
clay +sand +peat moss +perlite	6.9	0.69	3.38	5960	692	910

The pots of cuttings were set inside a plastic tunnel, all horticultural practices included irrigation and tied closure of tunnel for one month were done. One month later the tunnel was opened and the cutting were fertilized by spraying with NPK nano nutrient at 2cm/l, simultaneously one side of the tunnel was opened during day and closed during night to acclimatize the rooted cuttings to the outdoor atmosphere. Then, the tunnel was removed permanently after two months of planting.

Experimental layout.

The layout of this experiment was factorial experiment in Randomized Complete Block Design (RCBD) with two factors the first was two planting dates (autumn and spring) and the second was ten growing media. All treatments were repeated three times. Each triplicate contains 5 pots. The plants received normal agricultural practices as often as needed.

During the transplanting of the rooted cuttings, pots with 25 cm diameter were filled by a mixture of sand +clay + peat moss (1:1:1 v: v: v) and the following data were registered :

1- Number of roots/cutting
2- Number of rooted cuttings/medium
3- Root length/cutting (cm)
4- Rooted cuttings percentage (%)
5- Number of leaves/cutting

Statistical analysis

All data obtained from the studied factors were subjected to analysis of variance (ANOVA) factor. The differences between means values of the different treatments were compared using the least significant difference (L.S.D). by 0.05%, as provided by Snedecor and Cochran (1989) using the MSTAT-C statistical software package.

RESULTS AND DISCUSSIONS

The effect of planting date, growing media and their combinations on root parameters of *Euphorbia milii* plant:

Tables (2 and3) illustrated that, all root parameters i.e. No. of root cutting, No. of rooted cuttings/medium**,** root length/cutting, rooted cuttings percentage of *Euphorbia milii* were increased by the planting date (autumn and spring) especially cutting which were taken in autumn in both seasons. On the other side, all growing media treatments in both seasons succeed in increasing these parameters with the superiority of the growing media T_8 (clay+ perlite +peat moss) followed by T_{10} (clay + sand + peat moss + perlite). Whereas T_9 (sand+ clay+ peat moss) ranked the third value in this concern. Furthermore, the combination effect between agriculture date and growing media treatments, data at the same tables revealed that all combinations between agriculture date and growing media treatments increased these parameters mentioned afore of *Euphorbia milii* plant. But highest values was scored by using the combined treatment between agriculture date (autumn) and T_8 (clay +perlite +peat moss), followed by descending combined treatment between agriculture date (autumn) and T_{10} (clay + sand + peat moss + perlite) at two years. on the other hand, the lowest values of this parameter scored by between agriculture date (spring) and T_1 (sand) at the two years.

Table 2. Effect of planting date and growing media and their combinations on No. of cutting roots and No. of rooted cuttings/medium of on *Euphorbia milii* during 2018 /2019 and 2019 /2020 seasons

Parameters	No. of roots/cutting						No. of rooted cuttings/medium					
	1st season			2nd season			1st season			2nd season		
Planting date (A)	Planting date (A)											
Growing media (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)
T_1	4.53	3.67	4.10	4.63	3.73	4.18	4.33	4.00	4.17	4.33	4.00	4.17
T_2	6.37	5.40	5.88	6.20	5.30	5.75	5.33	5.33	5.33	5.67	5.00	5.33
T_3	6.93	5.90	6.42	6.80	5.93	6.37	6.00	5.33	5.67	6.33	5.33	5.83
T_4	5.53	4.73	5.13	5.60	4.63	5.11	5.00	4.67	4.83	5.00	5.00	5.00
T_5	8.37	7.07	7.72	8.40	7.10	7.75	6.67	6.33	6.50	7.00	6.33	6.67
T_6	9.80	8.50	9.15	9.90	8.50	9.20	8.00	7.67	7.83	7.67	8.00	7.83
T_7	7.47	6.40	6.93	7.63	6.40	7.02	6.33	6.00	6.17	7.00	6.00	6.50
T_8	11.53	10.20	10.87	11.47	10.17	10.82	9.33	9.00	9.17	9.67	9.33	9.50
T_9	8.53	7.23	7.88	8.70	7.33	8.02	7.33	7.00	7.17	7.67	7.33	7.50
T_{10}	10.97	9.47	10.22	10.77	9.57	10.17	8.67	8.33	8.50	8.67	8.33	8.90
Mean of (A)	8.00	6.86		8.01	6.87		6.70	6.37		6.90	6.47	
L.S.D at 0.05	A= 0.081 B=0.181 AXB=0.256			A= 0.087 B= 0.196 AXB=0.277			A= N.S. B= 0.762 AXB=1.078			A= 0.367 B= 0.822 AXB=1.162		

T_1= sand , T_2= sand +clay, T_3 sand +peat moss, T_4= sand +perlite, T_5 perlite +peat moss, T_6= perlite +clay, T_7= clay +perlite +sand, T_8= clay+perlite +peat moss T_9= clay +sand +peat moss, T_{10}= clay +sand +peat moss +perlite

Table 3. Effect of planting date and growing media and their combination on Root length/cutting and Rooted cuttings percentage (%) on *Euphorbia milii* during 2018 /2019 and 2019 /2020 seasons

Parameters	Root length / cutting						Rooted cuttings percentage (%)					
Rooted cutting	1st season			2nd season			1st season			2nd season		
Planting date (A)	Planting date (A)											
Growth stimulants (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)
T_1	3.07	3.20	3.13	2.70	2.83	2.77	43.33	40.00	41.67	43.33	40.00	41.67
T_2	3.70	4.20	3.95	3.73	3.40	3.57	53.33	50.00	51.67	56.67	50.00	53.33
T_3	3.53	3.17	3.35	3.57	3.77	3.67	60.00	53.33	56.67	63.33	53.33	58.33
T_4	3.27	3.30	3.28	2.97	3.30	3.13	50.00	46.67	48.33	50.00	50.00	50.00
T_5	5.00	3.83	4.42	3.93	4.40	4.17	66.67	63.33	65.00	70.00	63.33	66.67
T_6	4.30	4.63	4.47	4.40	3.80	4.10	80.00	76.67	78.33	76.67	80.00	78.33
T_7	4.20	4.63	4.42	4.07	3.80	3.93	63.33	60.00	61.67	70.00	60.00	65.00
T_8	5.57	5.67	5.62	5017	5.50	5.33	93.33	90.00	91.67	96.67	93.33	95.00
T_9	4.43	4.57	4.50	4.30	4.00	4.15	73.33	70.00	71.67	76.67	73.33	75.00
T_{10}	5.43	5.50	5.47	4.70	5.37	5.03	86.67	83.33	85.00	86.67	83.33	85.00
Mean of (A)	4.25	4.27		3.95	4.02		67.00	63.33		69.00	64.67	
L.S.D. at 0.05 ~~for~~	A= N.S. B=0.754 AXB=1.066			A= N.S. B= 0.747 AXB=1.056			A= 3.430 B= 7.670 AXB=10.85			A= 3.673 B= 8.214 AXB=11.62		

T_1= sand , T_2= sand +clay, T_3 sand +peat moss, T_4= sand +perlite, T_5 perlite +peat moss, T_6= perlite +clay, T_7= clay +perlite +sand, T_8= clay+perlite +peat moss T_9= clay +sand +peat moss, T_{10}= clay +sand +peat moss +perlite

Effect of planting date, growing media and their combinations of No. of leaves / cutting:

Table (4) shows that, No. of leaves/cutting of *Euphorbia milii* plant was increased by the planting date (autumn and spring) especially cuttings which taken in autumn in both seasons. No. of leaves/cutting was greatly affected by all growing media treatments in both seasons with the superiority of growing media T_8 (clay +perlite +peat moss) at (7.52 and 7.52), followed byT_{10} (clay + sand + peat moss + perlite) at (6.92 and 6.88). Whereas T_6 (perlite +clay) at (6.42and 6.50) ranked the third value in this concern in 1st and 2nd seasons, respectively. Moreover, the effect of combining planting date and growth media treatments, data in the same table showed that all combinations between planting date treatments and growing media treatments increased the mentioned variable before *Euphorbia milii* plant. However, the highest values were recorded using the co-treatment between planting date (autumn) and T8 (clay + perlite + peat moss), then followed descendingly by the co-treatment between planting date (autumn) and T10 (clay + sand + peat moss + perlite) in both seasons. On the other hand, the lowest values for this treatment were recorded between planting date (spring) and T1 (sand) at (1.98 and 2.07) in both seasons

Table 4. Effect of planting date and growing media and their combinations on No. of leaves / cutting of *Euphorbia milii* during 2018 /2019 and 2019 /2020 seasons

Parameters	No. of leaves / cutting					
Rooted cutting	1st season			2nd season		
Planting date (A)	Planting date (A)					
Growth stimulants (B)	Autumn	Spring	Mean of (B)	Autumn	Spring	Mean of (B)
T_1	2.10	1.87	1.98	2.20	1.93	2.07
T_2	4.20	3.30	3.75	4.27	3.27	3.77
T_3	4.83	3.87	4.35	4.80	3.77	4.28
T_4	3.63	2.93	3.28	3.82	2.93	3.37
T_5	6.37	5.07	5.72	6.40	5.07	5.73
T_6	7.20	5.63	6.42	7.27	5.73	6.50
T_7	5.57	4.47	5.02	5.53	4.53	5.03
T_8	8.53	6.50	7.52	8.47	6.57	7.52
T_9	6.93	5.50	6.22	6.73	5.50	6.12
T_{10}	7.77	6.07	6.92	7.70	6.07	6.88
Mean of (A)	5.71	4.52		5.72	4.54	
L.S.D. at 0.05 ~~for~~	A= 0.086 B= 0.192 AXB=0.272			A= 0.041 B= 0.202 AXB=0.286		

T_1= sand , T_2= sand +clay, T_3 sand +peat moss, T_4= sand +perlite, T_5 perlite +peat moss, T_6= perlite +clay, T_7= clay +perlite +sand, T_8= clay+perlite +peat moss T_9= clay +sand +peat moss, T_{10}= clay +sand +peat moss +perlite

In this context, planting media containing leaf compost + peat moss + vermiculite or clay containing clay + sand + peat moss (1:1:1 by volume) is necessary to help improve the growth, quality and nutritional status of plants. This was confirmed by Muhammad (2016), who stated that it is better to treat the cuttings of *Cupressus macrocarpa* using IBA at a rate of 4000 parts per million, as well as to plant it in a medium containing (sphagnum peat + perlite) to obtain the highest percentage of rooting and improve growth rates. This is confirmed by Bidarnamani and Zari (2014) on pothos (*Scindapsus aureum L.*), Youssef (2014) on *Beaucarnea recurvate* , Mohamed (2018) on *Dypsis cabadae* ,Fazeli Kakhki (2020) on *Spathiphyllum wallisii L.*, Mohamed *et al* (2020) on *Aspidistra elatior L*. Plant plant, Ghatas (2020) on *Cupressus macrocarpa* , Rashidha, et al (2021) on *Aglaonema commutatum var. 'Silver Fros'* , Esringu *et al.* (2022) on *Zinnia elegans* , Eed *et al*. (2015) On *Bougainvillea spp* , Topacoglu *et al*. (2016) on *Ficus benjamina L* , Youssef *et al* (2020) stated that, growing *Cupressus macrocarpa* plant in a medium contained compost+ perlite+ peat moss produced the best growth and quality of lemon cypress Sarkar *et al.* (2016) on *Dieffenbachia and Dracaena* and El-Naggar and Esmaiel (2022),since they found that for obtaining the best plants, dracaena cuttings were soaked in a solution of humic acid (H) at 30.0 gml-1 for 24 hours and planted in a mixture of peat + perlite

Conclusively, cultivating *Euphorbia milii* cuttings in a medium containing a mixture of clay + perlite + peat moss in (autumn) gave the best quality of rooting and growth in cutting *Euphorbia milii* L.

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تأثير ميعاد الزراعة وبيئات النمو المختلفة على تجذير عقل الايفوربيا ميلي

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[٢] نباتات الزينة والطبية والعطرية ، كلية الزراعة ، جامعة بنها

الملخص

تم إجراء تجربة اصص خلال موسمي ٢٠١٨/٢٠١٩ و ٢٠١٩/٢٠٢٠ في مزرعة الزينة ، قسم البساتين ، كلية الزراعة ، جامعة بنها ، لمعرفة تأثير ميعاد الزراعة وخليط من بيئات الزراعة على تحسين وتعزيز تجذير ونمو عقل الايفوربيا ميلي. أظهرت النتائج أن زراعة عقل الايفوربيا ميلي في (الخريف) وفي وسط مخلوط يحتوي على الطين + البيرلايت + البيت موس (١: ١: ١ بالحجم) أنتج أعلى قيم عدد الجذور لكل عقلة ، عدد العقل المتجذرة فى كل مخلوط بيئة تم استخدمة ، طول الجذور ، النسبة المئوية للتجذير وعدد الأوراق لكل عقل يليها (الطين + الرمل + البيت موس + البيرلايت) (١: ١: ١ ؛ ١ بالحجم) ، بينما ، (الطين + البيرلايت) (١: ١ بالحجم) في (الخريف) المرتبة الثالثة في هذا الاهتمام. بشكل قاطع ، فإن زراعة عقل الايفوربيا ميلي في بيئة يحتوي على الطين + البيرلايت + البيت موس في (الخريف) أنتج أفضل تجذير وجودة للعقل.