

INFLUENCE OF IBA AND MEDIA ON ROOTING PERCENTAGE AND GROWTH OF SEMI-HARDWOOD CUTTINGS OF RED-TIP PHOTINIA PLANT (*PHOTINIA X FRASERI*).

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ABSTRACT:

Experiment was carried out in plastic house that belong to the Red Rose Nursery / Dohuk government in autumn season between 1st Oct 2018, to 30th May 2019, to discuss the effect of media (peat moss, sand and peat moss+ sand), & IBA concentrations (0, 4000, 6000, 8000) mg.l⁻¹ on rooting might of Semi-hardwood cuttings of photinia (*Photinia x fraseri*) plant. Results indicate that the highest rooting percentage (50.88) %, plant high (19.17) cm, vegetative fresh weight (9.10) gm and vegetative dry weight (4.09) gm was recorded in cutting that planted in peat moss media which significantly superior than other media. In the other hand the 6000 & 8000 mg.l⁻¹ of IBA caused increased in rooting percentage reached 50.56% and 51.78% respectively , vegetative fresh and dry weight also significantly increase when applied to 4000 and 6000 mg.l⁻¹ of IBA they reached to 8.87 gm, 3.82 gm compared with 2.62gm for control. In addition, fresh and dry root weight significantly increased with IBA increase from 4000 to 6000 mg.l⁻¹, the highest length of plant is significantly increased reaching 34.11 for 6000-mg.l⁻¹. The interaction between media and IBA concentrations cased increased significantly in all parameters and the highest rooting percentage (73.33) %, plant high (43.33) cm, leaf number (24.00) leaves were for peat moss media and 600 mg.l⁻¹

KEYWORDS: IBA concentration, media effects, Fraser's photinia

INTRODUCTION

Red-tip photinia (*Photinia x fraseri*) organ of the Rosacea family, woody broadleaf shrub evergreen, densely foliated, grows 4.5 to 6 meter in height by 3.2 to 3.6 meter wide. Bright red leaves among the dark green, ten cm wide flower clusters appear in the beginning of spring followed by showy red berries, which ripen to black. It planted for its attractive, bright red of new leaf growth, hedge, massing, screen, and border. cuttings of red-tip photinia have been shown to be difficult to- root (Dirr, 1990). The temperature, mechanical treatment, mist spray, media, hormone, light, are the external factors that affect the rooting of cutting, rooting compounds use in rooting for moderate the difficult-to-root species, hastened root initiation, improve the number and rooting uniformity, and reduce rooting time (Owen and Roberto, 2018; Abera and Sulaiman, 2019). Rooting hormone will increase

the percentage of rooting in most cases, and hesitant it's develop and improve its quality. Semi-hardwood cuttings rooted beastly with a 10000 mg.l⁻¹ IBA quick-dip or 8000 mg.l⁻¹ talc, wounding cuttings with leaves trimming and 3000 to 8000 mg.l⁻¹ IBA talc or quick dips are optional for *P. x fraseri* (Hartmann *et al*, 2002). (Bonaminio and Blazich, 1983) found that increased IBA to 10000 mg.l⁻¹ utilized to semi-hardwood terminal cuttings of *Photinia x fraseri* increased the roots number per cutting and accelerate rooting more effective than control. (Hammo, *et al.*, 2013) indicated that the best rooting percentage for hardwood cuttings of *Photinia x fraseri* in spring season are 60.93% when applying 6000 and 8000 mg.l⁻¹ of IBA and increase significantly in rooting percentage 67.11% , 68.33% compared with control 39.00%. furthermore number of roots significantly increased with IBA increase to 4000, 6000, 8000 mg.l⁻¹

Growing media is substantial factor in propagation studies because rooting efficacy depends on the type of medium used (**Ingram et al., 1993**) A soilless media are good for plant cuttings because its loose character, well-draining so oxygen movement for newly forming roots such as perlite, sand and vermiculite or a combination of peat moss and any of the previous materials. The type of media chosen depends on personal choice, type of irrigation, cost, crop type and type of greenhouse. Some types of plants grow better when planted in some soilless mixture than do others (**Kessler, 2004**). The addition of organic matter which differs in its content depending on the source and its role in improving the physical properties and its ability to retain moisture and increase the decomposition of minerals from the major and minor elements (**Al Naime, 2000; Cabrera 2003**). Peatmoss is the most common growing media components used in horticulture; it is very light weight, adequate aeration, high CEC, and water holding capacity (15 times its dry weight), pH (3.2 to 4.5), and little or no potassium or phosphorus and small amount of nitrogen, get better physical characteristics of the soil such as porosity (**Hartmann et al., 2014**). In comparison between the rosemary that planted in a soilless media and that grown in soil garden they indicate that the soilless media produced taller plants with highest dry weight (**Boyle et al., 1991**). So that, the experiment performed to evaluate the root formation of red photinia to the growth media and type of hormone will enhance successful of plant establishing.

MATERIALS AND METHODS

The study was done in heated plastic house that belong to the Red Rose Nursery/ Dohuk government, in autumn season from 1st Oct 2018, to 30th May 2019, to investigate the influence of IBA concentrations (0, 4000, 6000, 8000) mg. l⁻¹ and three media (peat moss, sand and peat + sand) (by volume 1:1) on the rotting percentage and growth of semi-hardwood cuttings made from broad-leaved evergreen species, woody, early fall

cuttings of deciduous plants with partially matured wood and leafy summer (**Hartmann et al, 2014**). of Fraser or red-tip photinia plant (*photinia x fraseri*), 12 ±2 cm cutting long were planted under uniform climate in heated plastic house, the leaves of 5cm basic part of cutting were removed and dipped in to (0, 4000, 6000, 8000) mg. l⁻¹ concentrations of IBA solution to a depth of 2 cm (quick deep for 10 second). Each one of the five treated cuttings were grown into 25cm diameter pots filled with once of studied media (peat moss or sand). The experiment was performed in heated plastic house by using sprinkler irrigation system for irrigation. After Six month the cuttings were gathered and data given including Rooting percentage%, plant length (cm), leave number/cutting, vegetative fresh weight (gm), vegetative dry weight (gm), roots fresh weight (gm), roots dry weight (gm). The experiment was performed by use RCBD design (5 cuttings for each pot × 3 rep × 3 media × 4 IBA concentration), the data was statistically analysis by use SAS program and the comparison between the means were done by using DMRT (**SAS, 2013**) under 5%.

III. RESULT & DISCUSSION

1- Influence of IBA and media on the rooting percentage, plant length, leaf number and vegetative fresh weight of semi-hardwood cuttings of photinia plant (*photinia x fraseri*)

Data in table (1) showed that the rooting percentage increased significantly as a result to increase IBA concentration to 6000 and 8000 mg. l⁻¹ that gave 50.56% and 51.78% respectively compared with control which give 15.00% only. The best Length (34.11) cm was for 6000 mg.l⁻¹ that significantly increased than other treatments. Leaf number of cutting that handled with 4000, 6000, 8000 mg.l⁻¹ increased significantly when compared with control only whereas vegetative fresh weight significantly increased when treated with 4000 and 6000 mg.l⁻¹ which gave 8.87 and 8.18 gm compared with control and 8000 mg.l⁻¹ which gives 6.10 and 6.43gm respectively .

Table (1): -Influence of IBA and media on the rooting percentage plant length, leaf number and vegetative fresh weight of semi-hardwood cuttings of photinia plant (*photinia x fraseri*)

	IBA concentration mg.l ⁻¹	Media			IBA effect
		peat moss	Sand	Peat moss + sand	
Rooting %	0	18.17 ^g	12.33 ^g	14.50 ^g	15.00 ^c
	4000	46.67 ^c	30.00 ^f	33.33 ^{ef}	36.67 ^b
	6000	73.33 ^a	38.33 ^{de}	40.00 ^{c-e}	50.56 ^a
	8000	65.33 ^b	43.33 ^{cd}	46.67 ^c	51.78 ^a
	Media effect	50.88a	31.00b	33.63b	
Plant length (cm)	0	14.70 ^e	10.00 ^f	13.40 ^{ef}	12.70 ^c
	4000	35.33 ^b	20.00 ^d	23.67 ^{cd}	26.33 ^b
	6000	43.33 ^a	25.33 ^c	33.67 ^b	34.11 ^a
	8000	24.33 ^{cd}	24.00 ^{cd}	24.00 ^{cd}	24.11 ^b
	Media effect	29.43 ^a	19.83 ^c	23.68 ^b	
leaf number/ plant	0	14.00 ^{de}	14.70 ^{c-e}	12.13 ^e	13.61 ^b
	4000	20.00 ^{ab}	21.00 ^{ab}	17.33 ^{b-d}	19.44 ^a
	6000	24.00 ^a	17.33 ^{b-d}	19.33 ^b	20.22 ^a
	8000	18.67 ^{bc}	18.00 ^{b-d}	21.33 ^{ab}	19.33 ^a
	Media effect	19.17 ^a	17.76 ^a	17.53 ^a	
Vegetative fresh weight (gm)	0	7.76 ^{b-d}	5.07 ^f	5.46 ^{ef}	6.10 ^b
	4000	11.56 ^a	7.24 ^{c-e}	7.80 ^{b-d}	8.87 ^a
	6000	9.08 ^b	6.50 ^{d-f}	8.95 ^{bc}	8.18 ^a
	8000	7.99 ^{b-d}	5.31 ^f	5.98 ^f	6.43 ^b
	Media effect	9.10 ^a	6.03 ^c	7.05 ^b	

In the otherwise, the peat moss media give the highest significantly means of the rooting percentage (50.88%), plant length (29.43) cm and vegetative fresh weight (9.10) gm compared with sand (31.00%), 19.83 cm, 6.03 gm and peat moss + sand (33.63%, 23.68 cm, 7.05 gm for the three characteristics respectively whereas the leaf number cannot be affected by this factor.

The best interaction between media and IBA that give the highest rotting percentage (73.33) %, plant length (43.33) cm, leaf number (24.00) leaf/plant was the peat moss and 6000 mg.l⁻¹ IBA compared with the less rotting percentage (12.33) %, plant length (10.00) cm, leaf number (12.13) leaf/plant for the control (0) mg.l⁻¹ which planted in sand media and peat moss + sand. The highest vegetative fresh weight (11.56) gm was for the

interaction between peat moss and 4000 mg.l⁻¹ IBA compared with 5.07 gm for the interaction between control and sand media.

2-Influence of IBA and media on vegetative dry weight, root fresh weight and root dry weight of semi-hardwood cutting of photinia plant (*photinia x fraseri*)

Data in table (2) show that cutting that treated with 4000 and 6000 mg. l⁻¹ IBA increased vegetative dry weight significantly to 3.82 and 3.51 gm respectively. Whereas fresh and dry root weight increased significantly when treated, with 6000 mg.l⁻¹ and it reach to 3.49 and 1.40 gm for the two characteristics respectively. The less means for the three characteristics in this table was for the control treatment (0 mg.l⁻¹). Cutting planted in peat moss media give highest mean 4.09 gm of

vegetative dry weight than the other media, while the fresh and dry root weight cannot be affected by the media.

The interaction between media and IBA on vegetative dry weight showed that 4000 mg.l⁻¹ of IBA and planting in peat moss media gave the greatest value reaching 5.20 gm compared with the less means 2.03 gm for control and sand media.

While interaction between sand media and 6000 mg.l⁻¹ of IBA gave the high fresh and dry root weight, reaching 4.10 gm and 1.64 gm respectively. Otherwise, the interaction between the sand media and 8000 mg.l⁻¹ IBA gave the less value reaching 1.86 and 0.75 gm for the two characteristics.

Table (2):-Influence of IBA and media on the vegetative dry weight, root fresh weight and root dry weight of semi-hardwood cuttings of photinia plant (*photinia x fraseri*)

	IBA concentration	Media			IBA effect
		peat moss	Sand	Peat moss+ sand	
Vegetative dry weight(gm)	0	3.49 ^b	2.03 ^e	2.35 ^{de}	2.62 ^b
	4000	5.20 ^a	2.90 ^{cd}	3.36 ^{bc}	3.82 ^a
	6000	4.09 ^b	2.60 ^{de}	3.85 ^b	3.51 ^a
	8000	3.60 ^{bc}	2.13 ^e	2.39 ^{de}	2.70 ^b
	Media effect	4.09 ^a	2.41 ^c	2.99 ^b	
roots Fresh weight(gm)	0	2.61 ^{b-d}	2.49 ^{b-d}	3.28 ^{ab}	2.79 ^b
	4000	3.00 ^{bc}	2.27 ^{cd}	2.55 ^{b-d}	2.60 ^b
	6000	3.26 ^{ab}	4.10 ^a	3.12 ^{bc}	3.49 ^a
	8000	3.39 ^{ab}	1.86 ^d	3.09 ^{bc}	2.78 ^b
	Media effect	3.06 ^a	2.68 ^a	3.01 ^a	
roots Dry weight(gm)	0	0.94 ^{cd}	0.90 ^{cd}	1.18 ^{bc}	1.01 ^b
	4000	1.20 ^{bc}	0.91 ^{cd}	1.02 ^{b-d}	1.04 ^b
	6000	1.30 ^b	1.64 ^a	1.25 ^{bc}	1.40 ^a
	8000	1.36 ^{ab}	0.75 ^d	1.24 ^{bc}	1.11 ^b
	Media effect	1.20 ^a	1.05 ^a	1.17 ^a	

The growth is affected by the media because it provides the plants root good penetration, better aeration, water holding capacity, also it is a main source of nutrition and organic matter, so the significantly influenced of media in this study may be due to the level of organic matter content, water holding difference. (Singh *et al.*, 2020; Abera and Sulaiman, 2019). The significantly increased in most growth characteristics might be caused by peat moss media which have a good environment conditions and nutrients availability or to the physical structure which has allowed the roots system to good development then led to the absorption of larger amounts of elements, increased soil aeration and increasing water holding capacity and biological activities (Abou El-Magd *et al.* 2006). On the other hand, because

of the soil porosity that makes good ventilation, prevents CO₂ accumulation in media, in addition the increase the soil granulation and acceptability center on water retention, and also increase the capacity of ion exchange (Nelson, 1991). Whereas benefit of auxin (IBA) treatments as reported by (Blazich, 1988) to increasing quality and number of roots produced per cutting, hastening root initiation, and increasing the similarity of rooting. Alternatively, the role of auxin in pack at the root formation and increased the number of forming cuttings (Berlyn and Greenwood, 1973).

CONCLUSIONS

As we know that photinia plant is difficult to root for this purpose we used IBA as rooting

hormone to increase ability for rooting the plant semi-hard wood cutting, the result indicated that using high concentration of IBA leads to increase in most of plant parameters. In the other hand using of media for growing also record significant effect on most plant parameters especially peat moss media compared with other media and control and this was proved that photinia plant is one of the plants that grow better when planted in some soilless mixture that do others.

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پوخته

ئەف قەكولینه هاته ئەنجامدان ل نه مامگه ها (رید روز) ل باژیروی دهوكی هەر ژ ئیكی هه یفا ئوكتوبه را 2018 و تا خزیرا نا 2019 به رده وام مایه. ئەف قەكولینه ئارمانج ژی ئەو بوو بۆ هه لسه نگاندا نا 3 ژ بیاقیت ب ئاخ و بی ئاخ (بیتمووس + خیزی باغچه ی + بیتمووس و خیزی باغچه ی). و ههروه سا کارتیکرنا هورمونی بتیراتیا (0 , 4000 , 6000 , 8000) ملغم/لیتره کی لسه ر شینبونا نه مامگیت رووه کی فتونیا IBA . و دیارترین ئەنجامین بده سته هاتین دقه کولینی دا پیک هاتبوو ژ:

1-بلندترین ئاستی رهدانی گه هشتیه (50.88%) و بلندایا رووه کی گه هشتیه (19.17) سم و کیشا که سکا تیا تازه گه هشتیه (9.10) گرام و کیشا که سکا تیا حشک گه هشتیه (4.09) گرام ئەف ئەنجامه هاتینه تومارکرن ل وان نه مامگیت هاتینه چاندن ل بیاقی بیتمووسی باشتیرین ئەنجامین پوزه تیف داینه به راورد دگه ل بیاقین دی کو هاتینه بکارئینان ل قه کولینی.

2-بکارئینانا تیراتیا (8000-6000) ملغم/لیتره کی ژ IBA بویه ئەگه ری زیده بونا ئاستی رهدانی بۆ (50.56%) و (51.78)% و ههروه سا کیشا که سکا تیا تازه و کیشا که سکا تیا حشک ئەوژی زیده بویه ده ما بکارئینانا تیراتیا (6000-4000) ملغم/لیتره کی بۆ (8.87) گرام و (3.82) گرام به راوردکرن دگه ل کونترولی کو گه هشتیه (2.62) گرام. ههروه سا کیشا رها تازه و کیشا رها حشک زیده بونه کا به رچاف بخوقه گرتیه ده می بکارئینانا IBA بتیراتیا (6000-4000) ملغم/لیتره کی. به رزترین بلندایا رووه کی گه هشتیه (34.11) سم هاتیه تومارکرن دگه ل بکارئینانا (6000) ملغم/لیتره کی .

3-بشیوه یکی گشتی بکارئینانا بیاقین چاندنی و تیراتین جیاواز ژ IBA بونه ئەگه ری زیده بونه کا پوزتیف ل هه می ساخله تین رووه کی و بلندترین ریژا رهدانی گه هشتیه (73.33%) و بلندایا رووه کی (43.33) سم و ژمارا به لگا بوو (24.00) به لگ ئەف ئەنجامه هاتیه تومارکرن ل بیاقی بیتمووسی و بکارئینانا تیراتیا (6000) ملغم/لیتره کی ژ IBA