

RESEARCH ARTICLE

(Open Access)**The vegetative propagation and the development of the root system of *Photinia x Fraser* "Red Robin" in February by help of IBA.**Gjok Vuksani^{1*}, Rovená Mataj², Angjelina Vuksani³, Fadil Shahini^{1*} Gjok Vuksani / Department of Horticulture and Landscape Architecture, Agricultural University of Tirana² Rovená Mataj / Department of Horticulture and Landscape Architecture Agricultural University of Tirana**Abstract**

Photinia spp is part of the Rosacea Family, evergreen bushes and shaded red in early growth. The experiment was conducted in the private greenhouse in Laknas, Tirana. On February 2015 pieces of *Photinia* were taken from the upper part of the mother plants. These pieces were cut at 10-12 cm length and a diameter of 0.2-0.5 cm. The pieces are placed on the rooting bank with 100% perlite. The pieces are treated before putting them to the rooting bank with phyto-hormone IBA (Indole Butyric Acid) an industrial powder "Germ" by growing 3 variants; Variant 1-2000 mg/l IBA, Variant 2-3000 mg/l IBA, Variant 3-4000 mg/l IBA. Besides the evaluation of the percentage of rooting, 3 measurements are performed at equal time intervals for: the length of seedlings, seedling diameter, root length, number of leaves, length of leaves, etc. For each variant it is also measured the dry weight of the stems and leaves of seedlings and dry weight of root system that is a very important element to show the preparation of the seedling to be transferred to the vase. At the end of our experimental work it is very important to evaluate what concentration of phyto-hormone has greater impact on the development of the seedling root system. So as a conclusion we can say that treatment with IBA 3000 and 4000 mg/l have a powerful impact on the development of the root system of *Photinia x fraseri* "Red Robin" than treatment with concentration 2000 mg/l IBA.

Keywords: vegetative propagation, phyto-hormone, Indole Butyric Acid, dry weight, roots

1. Introduction

Photinia is a multi-stemmed large shrub that grows to a height and spread of 2, 5-4 m. The plant is native to areas of Asia and India and produces glossy, evergreen leaves.

They have been widely cultivated throughout the world as ornamentals for their white flowers and red fruits. The red color of the new leaves in spring, contrasted against the dark evergreen older leaves, has given the plant the popular name "Red Robin" to the cultivar *Photinia x fraseri*.

The scientific name *Photinia* is also widely used as the common name.

Photinia x Fraseri although in Albania is cultivated only in recent years in other country has been the subject of several scientific research which was briefly presented below.

For ornamental plant species, cultural practices (time of year, medium temperature, light level, air temperature, misting, etc.) are often used to stimulate rooting and reduce the length of time needed to root stem cuttings (6).

IBA causes significantly increase in shoots growth number, all IBA concentration show significantly increase in leave number ... for Fraser's *Photinia* (7).

Rooting percentage and mean number of roots for Fraser's Photinia cuttings did not differ between August 2002 and November 2003 ... (5).

A number of researches regarding rooting of Fraser's Photinia cuttings have been conducted in U.S.A. during spring (1) and summer (2, 3, 4). However, this research indicates rooting Fraser's Photinia cuttings during February.

The aim of our research is to realize the Photinia vegetative propagation during the winter when the difficulty is greater in order to meet market demand for seedlings in early spring.

On February 2015 pieces of Photinia x Fraser "Red Robin" are taken from the upper part of the mother plants. These pieces are cut at 10-12 cm length and a diameter of 0.2-0.5 cm. The pieces are placed on the rooting bank with 100% perlite.

The pieces are treated before putting in the rooting bank with phyto-hormone IBA (Indole Butyric Acid) like an industrial powder "Germ" by growing 3 variants; Variant 1 -2000 mg/l IBA, Variant 2-3000 mg/l IBA, Variant 3-4000 mg/l IBA. At the end of our experimental work it is very important to evaluate what concentration of phyto-hormone has greater impact on the development of the seedling root system.

2. Material and methods

The experiment was conducted in a private farm in Laknas, Tirana. The greenhouse is equipped with a rooting bank with perlite 100% and irrigation system from above as fog.



Figure No. 1: Pieces of Photinia x Fraser "Red Robin" placed in the rooting bank.

On February 3, 2015 pieces were taken from the upper part of the plant's parent Photinia x Fraser "Red Robin".

These pieces were cut at 10-12 cm length and a diameter of 0.2-0.5 cm. The pieces are placed in the rooting bank with 100% perlite.

Pieces placed before for rooting were treated with phyto-hormone IBA (Indole butyric acid) in the form of industrial dust "Germ" by growing 3 variants;

Variant 1 -2000 mg/l IBA

Variant 2-3000 mg/l IBA

Variant 3- 4000 mg/l IBA

For each variant they are planted at least 200 pieces placed in the rooting bank in the same temperature, humidity and lighting conditions.

Three measurements of seedlings are realized with an interval of 30 days, in the laboratory of the Department of Horticulture and Landscape Architecture.

Estimated parameters are: the length of seedling, seedling diameter, root length and number of leaves(8).

After drying in the thermostat at a temperature of 105 °C, measurements were made of the dry weight of roots and dry weight of the entire above-ground part seedling.

To certify the influence of different concentrations of IBA in rooting and development of seedling root system to *Photinia fraseri* "Red Robin", we realized the analysis of variance of the dry weight of the root system.

3. Results and discussion

A sample of quantitative parameters to rate the influence of IBA in rooting is the percentage of rooting.

In the third measurement was conducted evaluation of the percentage of rooting for each variant.

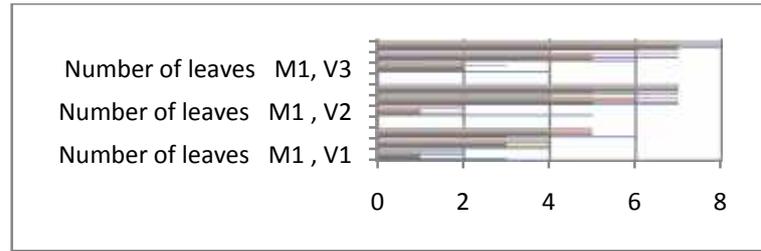
No.	Variant	The concentration of IBA	The percentage of rooting
1	Variant 1	2000 mg/l	48%
2	Variant 2	3000 mg/l	57%
3	Variant 3	4000 mg/l	61%

Table No.1. The influence of IBA in rooting is the percentage of rooting.

Taking into consideration the experimental data it can be concluded that the highest percentage of rooting is reached in Variant 3 with 61% and to Variant 2 with 57% while the version with the smaller impact of IBA treatment is Variant 1 (2000 mg/l IBA) with 48% of rooting cuttings.

To rate the impact of phyto-hormone IBA in the development of leaf surface of seedling, we have

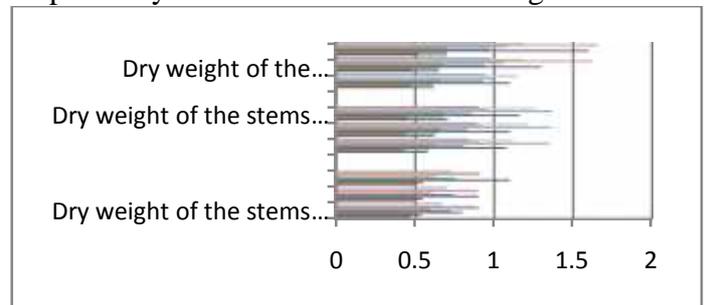
counted the number of leaves for which measurement.



FigureNo. 2. The impact of IBA concentration in the number of leaves developed for each seedling

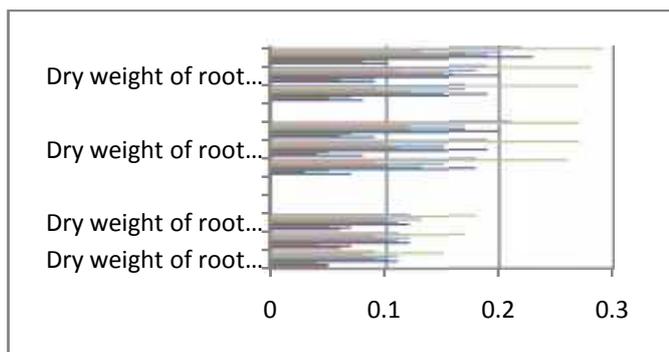
The data obtained are presented in the **FigureNo. 2**, where we see quite clearly that the number of leaves developed for each seedling is higher in Variant 3, treated with 4000 mg/l IBA to 8 leaves which gives a good chance for plants to be developed in the vase.

From the **FigureNo. 3** below it seems a clear positive impact of IBA on the dry weight of the stems that have in Variant 2 and Variant 3, respectively treated with 3000 and 4000 mg/liter.



FigureNo. 3. The impact of IBA concentration on the dry weight of the stems

This conclusion goes in the same line with scientific findings of other authors; "...on *Myrtus communis* it was found that an increased concentration of IBA from 2250 to 3750 mg/l, significantly increases the total root length, root dry weight, number of plants" (10).



FigureNo. 4. The impact of IBA concentration on the dry weight of root system

From the Figure No. 4 it is noted that the greatest impact of IBA on the dry weight of root system was in: Variant 2 and Variant 3, respectively treated with 3000 and 4000 mg/liter.

The final results of the dry weight of the root system is greater at Variant 3, treated with 4000 mg/l IBA, then descends slightly to Variant 2 treated with 3000 mg/l IBA and the weight of the root system is lower in variant 1 treatment with 2000 mg/l IBA.

In conclusion, we can say the influence of IBA in the percentage of rooting and the development of the root system is higher at levels of 3000-4000 mg/l. To verify the influence of different concentrations of IBA in rooting and root system development of seedling of *Photinia x fraser* "Red Robin" we carried out the Variance Analysis of the dry weight of the root system.

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.02318	2	0.01159	3.277097	0.05319	2.510609
Within Groups	0.09549	27	0.003537			
Total	0.11867	29				

Table No.2. The Variance Analysis of the dry weight of the root system.

Since calculated F is greater than the critical F (Fisher's test) for results of variants treated with different concentrations of IBA (V1.2000mg/l, V2 3000 mg/l and V3 4000 mg/l) it proves that there are statistically differences validated for the importance level of 0.05 per weight of the dry rootsystem.

But for the purposes of our experiment it is very important to identify which concentration gives a greater impact in the development of the root system.

Therefore, by means of analysis of variance, we tested the variability for each variant. Since calculated F is greater than critical F (test of Fisher) between Variant 1 and Variant 3, there are statistically differences validated for levels of 0.05 of the importance per weight of the dry root system, while between Version 2 treated with 3000 mg/l IBA and variant 3 treated with 4000 mg/l IBA were not proved statistically differences. So as a conclusion we can say that the treatment with IBA 3000 and 4000 mg/l has a powerful impact on the development of the root system of *Photinia x fraser* "Red Robin" than the treatment with a concentration of 2000 mg/l IBA.

4. Conclusions

Vegetative propagation under irrigation system from above as fog with the help of IBA is a successful technique that can be used efficiently in Albanian Floriculture.

1-February is relatively suitable for getting pieces of *Photinia x fraser* "Red Robin" and their placement for rooting with the help of IBA; it gives relatively satisfactory feedback in terms of rooting percentage.

Variant 3 treated with 4000 mg/l IBA has achieved better results in rooting by 61% while the pieces of Variant 2 are rooted at 57% after treatment with 3000 mg/l IBA. The variant with smaller impact of treatment with IBA is Variant 1 (with

2000 mg/l IBA) with 48% of rooting cuttings placed in the rooting bank in February.

2- The final results of the dry weight of the root system is greater at Variant 3, treated with 4000 mg/l IBA, then descend slightly to Variant 2 treated with 3000 mg/l IBA and the weight of the root system is lower in Variant 1 treated with 2000 mg/l IBA.

In conclusion, we can say that the influence of IBA in the percentage of rooting and dry weight of the root system is higher at levels of 3000 and 4000 mg/l.

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So as a conclusion we can say that the treatment with IBA 3000 and 4000 mg/l has a powerful impact on the development of the root system of *Photinia x fraseri* "Red Robin" than the treatment with a concentration of 2000 mg/l IBA.

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