IMPACT OF PROPAGATION MEDIA AND DIFFERENT LIGHT LEVELS ON VEGETATIVE PROPAGATION OF BEGONIAS

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ABSTRACT: Begonia is a popular flowering and foliage ornamental plant. Details of the propagation of begonia such as media, light or shade requirement and other needed information are not readily available. Homogenous wedge leaf cuttings of two different varieties of (*Begonia heracleifolia* and *Begonia abelcrriere*) were used to propagate young new plants in five different combinations of growing media composed of sand, top soil and coir dust and four light levels (37%, 60%, 79%, and 100%) with and without application of rooting hormones. A commonly used rooting hormone "Naphylelacetic acid" (0.3%) as a rooting promoter was used to test the effectiveness in propagation. Black polythene bags were used as propagation containers. Metal frames were used to obtain half circle shaped propagators. Transparent polythene was used to protect the propagators from excess rainwater. A Complete Randomized Design was used with three replicates and data was analyzed using SAS statistical software package.It revealed that, the application of Napthylacetic acid as a rooting had no impact on propagation of Begonia varieties studied. Further a rooting medium composed of top soil: coir dust = 1:1 and 60% light levels were the most suitable conditions for the successful propagation of begonias through leaf cuttings.

Keywords: Begonia, Propgagation, Media

Introduction

Floriculture is a growing industry in Sri Lanka, where flowering and foliage plants have a considerable demand in the local and export markets. The demand for the indoor plants has found to be increasing during the past decades due to urbanization, where people use living ornaments to enhance the cosmetic effects of houses, hotels and offices.

Begonia is a popular foliage plant grown in Sri Lanka, which includes hundreds of different varieties. Natural habitats of Begonias are tropical and sub-tropical evergreen rain forests (Lynn and Grimth, 1997). In a family so diversified as begonia, a clear and well-defined classification is difficult. Botanically there are two classes namely Fibrous-rooted and tuberous. Some authorities add a third class haomatous (Graf, 1980). Begonia is commonly propagated using vegetative means or techniques, where vegetative parts of the mother plant are used to produce true to type of homogenous new plantlets.

Production of uniform healthy young plants in a relatively shorter period is one of the major requirements for the survival of the floriculture industry. Begonia can be propagated from seed (in warm locations), from cuttings of stems, and leaves. Among the above methods mentioned, the use of leaf cuttings is the most popular method of propagation for Rhizomatus and Rex Begonias. This method can also be used with the few cane and shrublike begonias where whole leaves, cone leaf cuttings and wedge leaf cuttings can be planted in proper rooting media which favors good drainage and aeration.

Although the method of propagation have been identified in literatures (Thompson and Thompson, 1981), the influence of propagation media, light or shade requirements, rooting pattern and early growth of this species has not been reported.

Therefore, this study was designed to determine the impact of different propagation media and light levels on the vegetative propagation of begonias.

Objectives

To evaluate the impact of different propagation medias and light levels on the vegetative propagation of begonias.

To determine the most suitable conditions for the successful propagation of begonias through leaf cuttings.

Methodology

Location of the study

This experiment was conducted in the plant house of the Department of Crop Science, Faculty of Agriculture, University of Peradeniya. Study period was 1st of October 2001 – 11th of January 2002.

Method of propagation

Homogenous wedge leaf cuttings of two different varieties of Begonias (*Begonia heracleifolia*and *Begonia abelcrriere*) were used to propagate young plants in five different combinations of growing media under four shade levels. A commonly used rooting hormone "Naphylelacetic acid" (0.3%) was used to test the effectiveness in propagation and root formation. Black polythene bags were used as propagation containers. Metal frames were used to obtain half circle shaped propagators. Transparent polythene was used to protect the propagatorsfrom excess rainwater.

Treatment combinations

Medium

Sand, coir dust and topsoil were used according to the following combinations.

1. Pure Sand
2. Top Soil: Coir dust = 1: 1
3. Sand: Coir dust: Top Soil = 1: 1: 1
4. Sand:Coir dust = 1: 1
5. Pure Coir dust

Light levels

Green coloured shade nets were used to obtain the following light levels.

1. 37%light
2. 60%light
3. 79%light
4. 100%light

Hormonal application

A commercial rooting powder containing 0.3% Naphthylacetic acid was used.

1. Applied
2. Not Applied

ExperimentalDesign

A Complete Randomized Design was used with three replicates.

Crop management

The plants were watered at regular intervals (twice a week) in order to maintain a proper humid environment in the propagators and to provide a moist medium. Regular fungicide application and regular management practices such asweeding sanitary maintenance and proper ventilation were adopted.

Data Collection and Analysis

Data collection was done on the following parameters

1. Time taken for the first bud break after planting (In weeks)
2. Total leaf area (cm^2)-10 weeks after planting
3. Effective leaf number (single leaves more than 100cm^2in size)10 weeks after planting.
4. Fresh weight of the plant (g) -10 weeks after planting.
5. Dry weight of the plant (g) -10 weeks after planting (Kept in oven at 104°C for 48 hours)
6. Root volume (cm^3) -10 weeks after planting (Fluid displacement method)

Data was analyzed using the SAS statistical package to determine the impact of the treatments on propagation of Begonias. AS the responses of both varieties to the adopted treatments were similar, the data was pooled for statistical analysis.

Result and Discussion

Time taken for the first bud break after planting (DBB)

The use of different propagation media, light levels and application of rooting hormone had no impact on time taken for the first bud break after planting (P=0.05). This indicates that the above treatments have no impact on time taken for the shoot initiation of the varieties studied. Among the different media used top soil: coir dust=1: 1 favoured early bud break (4.90 weeks) whereas pure coir dust delayed bud break (6.38 weeks). Similarly a 79% light level shortenedthe time taken to initiate first bud (5.2 weeks) while 37% light level delayed bud break (6.1 weeks).

Table : 1 Impact of potting media, light required and rooting hormones on time taken for the first bud break after planting (DBB) in Begonia propagules.

	Treatments	Mean Values of DBB
	Pure Sand	5.26
Medium	Top Soil: Coir dust = 1: 1	4.90
	Sand: Coir dust: Top Soil = 1: 1: 1	5.59
	Sand: Coir dust = 1: 1	5.72
	Pure Coir dust	5.38
	37% light	6.06
Light Level	60% light	5.45
	79% light	5.16
	100% light	5.61
Hormone Application	Applied	5.76
	Not Applied	5.38

*There was no significant difference between the mean values within a major treatment.

Total Leaf Area (LA)

Application of rooting hormone had no impact on leaf area of both Begonia varieties. Similarly the different levels of shading had no effect on this parameter. This indicates that shading has no impact on leaf development and expansion in these two Begonia varieties.

In contrast, the use of different potting media had a significant impact on the leaf area of begonias (Table 2). The medium with a mixture of top soil: Coir dust = 1:1 produced plants with the highest mean total leaf area (68.11 cm^2), while pure coir dust produced the lowest leaf area of 11.79 m^2. The greater leaf area in the topsoil: coir dust = 1:1 medium could be attributed to the incorporation of coconut dust which improves wettability to maintain good moisture and porosity (Yahya and Ismail, 1996) and (Fjeld*et. al*. 1993).

Table – 2 Total Leaf Area (LA) as affected by the rooting media, light and rooting hormones in Begonias.

	Treatments	**Mean LA**
Medium	Pure Sand	35.43 *
	Top Soil: Coir dust = 1: 1	68.11 *
	Sand: Coir dust: Top Soil = 1: 1: 1	35.66 *
	Sand: Coir dust = 1: 1	51.54 *
	Pure Coir dust	11.79 *
Light Level	37% light	34.46
	60% light	47.56
	79% light	48.32
	100% light	31.68
Hormone Application	Applied	36.30
	Not Applied	44.72

*Mean values are significantly different within a major treatment.

The provision of potassium by coir dust could also help to produce large plants. Among the light treatments 79% light level produced the highest mean total leaf area of 48.32 cm^2 and 100% light produced lowest total leaf area which was 31.70 cm^2. This clearly illustrated the requirement of shade for Begonias.

Effective Leaf Number (ELN)

Application of rooting hormone had no impact on the numbers of effective leaves. In contrast, potting media and shade levels had a significant impact on this parameter (P=0.05). The medium composed of a mixture of topsoil: coir dust = 1:1 produced the highest number of mean effective leaves (4.6 leaves / plant), whereas pure coir dust medium produced the lowest number (2.05 leaves/plant). This indicates that pure coir dust did not promote leaf production and expansion in bothvarieties studied.

Among the light treatments, plants grown under 60% light produced the highest number of effective leaves (3.9), whereas37% light produced the lowestmean of 2.6 leaves. Plants propagated with and without rooting hormone produced 3.54 and 3.12 mean effective leaves respectively.

Table – 3 Change in Effective Leaf Number (ELN) of Begonia propagules with different potting media, light and application of rooting hormones.

	Treatments	Mean ELN
	Pure Sand	3.59 *
Medium	Top Soil: Coir dust = 1: 1	4.58 *
	Sand: Coir dust: Top Soil = 1: 1: 1	3.17 *
	Sand: Coir dust = 1: 1	3.27 *
	Pure Coir dust	2.05 *
	37% light	2.65 *
Light Level	60% light	3.97 *
	79% light	3.23 *
	100% light	3.49 *
Hormone Application	Applied	3.12
	Not Applied	3.54

*Mean values are significantly different within a major treatment

Fresh Weight of the plant (FW)

Shading and application of rooting hormone did not influence fresh matter production of Begonia varieties. In contrast, different potting mixtures had a significant impact on this parameter.Among the parameter used top soil: coir dust = 1:1 produced the highest mean fresh weight of 4.70 g whereas the lowest was 1.4 g produced from pure coir dust (p=0.05). The above result showed that, although coir dust can retain more water and favor better fresh matter production as a mixed ingredient (Table - 4),sole coir dust is not a suitable propagation medium as it leads poor aeration due to higher water retention (hold 9-10 timers of water W/W).

Table 4 – Impact of potting media, light required and rooting hormones on fresh weights (FW) and Dry weight (DW) of Begonia propagules.

Treatments		Mean FW	Mean DW
Medium	Pure Sand	2.96 *	0.38 *
	Top Soil: Coir dust = 1: 1	4.72 *	0.30 *
	Sand: Coir dust: Top Soil = 1: 1: 1	2.61 *	0.24 *
	Sand: Coir dust = 1: 1	3.58 *	0.32 *
	Pure Coir dust	1.44 *	0.09 *
Light Level	37% light	2.84	0.21 *
	60% light	3.38	0.25*
	79% light	3.13	0.30 *
	100% light	2.89	0.30 *
Hormone Application	Applied	2.98	0.24 *
	Not Applied	3.14	0.29*

*Mean values are significantly different within a major treatment

Dry Weights of the plant (DW)

Shade levels and hormonal application had no impacts on dry weight of begonias (P=0.05). The propagation medium also did not show any significant impacts on dry weight unlike in fresh weights (Table 4). Therefore that the difference in fresh weight is due to the variation in moisture content of the plantspropagated using different media. However pure sand produced the highest mean dry weight of 0.38 g and highest mean dry weight (0.09 g) was obtained from the pure coir dust medium. Among the light treatments 37% light produced 0.219 dry matter and 79% and 10 light levels produced 0. 39 dry matter.

Root Volume (RV)

Shading and application of rooting hormone had no impact on root volume of Begonia varieties. This indicates that early root production and development was not affected by these treatments.In contrast, use of different potting mixtures had a significant impact on rooting (p=0.05). the medium composed of a mixture of top soil : coir dust = 1:1 produced the highest mean root volume of 0.29 cm^3 whereas the lowest was 0.13 cm^3 was produced from pure coir dust. The greatest root growth in top soil : coir dust medium is due to incorporation of coir dust to top soil which helps to improve physical, chemical, and biological properties of top soil. This facilitates plant roots to grow vigorously.

Table 5 – Impact of different potting media, light required and rooting hormones on root volume (RV) of Begonias.

Treatments		Mean RV
Medium	Pure Sand	0.19 *
	Top Soil: Coir dust = 1: 1	0.29 *
	Sand: Coir dust: Top Soil = 1: 1: 1	0.22 *
	Sand: Coir dust = 1: 1	0.27 *
	Pure Coir dust	0.13 *
Light Level	37% light	0.19
	60% light	0.22
	79% light	0.24
	100% light	0.22
Hormone Application	Applied	0.22
	Not Applied	0.22

*Mean values are significantly different within a major treatment

Conclusion

This study highlights that, the application of Napthylacetic acid as a rooting had no impact on propagation of Begonia varieties studied. Further a rooting medium composed of top soil: coir dust = 1:1 and 60 % light levels were the most suitable condition for the successful propagation of Begonias through leaf cuttings.

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