

# Effect of polybag size on seedling growth of three commercial multipurpose trees in Bangladesh

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**Abstract:** An experiment was conducted to observe the effect of polybag size on the growth of Kalokoroi (*Albizia lebbbeck*), Raintree (*Albizia saman*) and Ipil-ipil (*Leucaena leucocephala*) seedlings during November, 2004 to June, 2005 at the pot yard of the Agroforestry department. Three different polybag size (23 cm x 15 cm, 20 cm x 13 cm and 17 cm x 11 cm) and three types of seedlings (Kalokoroi, Raintree and Ipil-ipil) were taken as two factors of the study with five replications. Polybag size showed significant influence on different growth parameters of the seedlings. All species grown in 23 cm x 15 cm sized polybag was observed to be superior to other treatments. The combined effect of different polybag sizes and species was also highly significant in all the parameters. The best performance was observed in S<sub>2</sub>T<sub>1</sub> (raintree grown in 23 cm x 15 cm size polybag) followed by S<sub>3</sub>T<sub>1</sub> (Ipil-ipil grown in 23 cm x 15 cm size polybag) and the lowest performance showed in S<sub>3</sub>T<sub>3</sub> (Ipil-ipil grown in 17 cm x 11 cm size polybag).

**Keywords:** Polybag size, Seedlings, Growth parameters.

## Introduction

Bangladesh is a densely populated country with 143596 km<sup>2</sup> area having 130.34 million people (BBS, 2002). The ever increasing population of Bangladesh appears as a dreadful problem. A vast majority of population who live in rural villages in Bangladesh are directly dependent on the continued productivity of soil, water and forest for their food, timber, fodder and fruit. Increasing deforestation has resulted not only severe but also has threatened the ecological balance of the country. Under this alarming situation massive afforestation program including first growing multipurpose trees can only help in increasing the first forest coverage of the country. Raintree (*Albizia saman*), Ipil-ipil (*Leucaena*

*leucocephala*) and Kalokoroi (*Albizia lebbbeck*) is an important multipurpose tree cultivated all over the country and use for production of timber, wood pulp, fuel, fodder and wind breaks, as browse for domestic grazing animals and to improve soil fertility. In recent years, the use of polybags in the nursery practices has been increased considerably due to massive afforestation and reforestation programs. It has many advantages in raising stocks, easy transportation and irrigation, unbreakable characters, easy availability of transparent and white colours, easy to make holes for aeration and drainage. Above all each polybag contains equal volume of rooting media for each seedling which is very important for growing tall, healthy and

uniform seedlings in the nursery. In the market different sizes of polybags with different thickness and colours are available, but it is difficult to standardize optimal size, thickness and colour for a particular species due to limited fund, facility and quantity of seed. Moreover, it is reported that in Eucalyptus hybrid non standard size of polybags (25 × 25 cm × 150 gauge) does not respond well as the seedlings remain short, lanky and suffer casualties in transport and planting (Singh *et al.*, 1985). Keeping this view in mind the research work was conducted to investigate the growth behavior of important timber seedlings in different size of polybags.

### **Materials and Methods**

The polybag experiment was carried out at pot yard of the Agroforestry department, Bangladesh Agricultural University, Mymensingh, during the month of November 2004 to June 2005. The soil for filling the polybag was collected from the field of the Agroforestry farm, Bangladesh Agricultural University, Mymensingh from a depth of 0-15 cm and the soil was dried in the sun and removed the plant roots, pebbles and mixed up with the manure and fertilizer following the recommendation rate of forestry department. An amount of 2, 1.5 and 1 kg soil was taken in for polybag like 23 cm × 15 cm, 20 cm × 13 cm, 17 cm × 11 cm, respectively. There were 135 polybags comprising 9 different treatments with 5 replications. Before sowing the collected seeds were soaked in hot water for 5 minutes then it was

rinsed with water for 5 minutes and kept in petridish over night for breaking the dormancy. Two seeds were sown in each polybag and proper intercultural operations were maintained during the studied period. The experiment was laid out in a two factorial Complete Randomized Design (CRD) with 5 replications.

#### **Factor A:**

S<sub>1</sub> = Kalokoroi

S<sub>2</sub> = Raintree

S<sub>3</sub> = Ipil-ipil

#### **Factor B:**

T<sub>1</sub> = Size of the polybag was 23 cm × 15 cm,

T<sub>2</sub> = Size of the polybag was 20 cm × 13 cm,

T<sub>3</sub> = Size of the polybag was 17 cm × 11 cm

Seedlings were harvested at 90, 150 and 210 day after sowing for measuring plant height (cm), base diameter (cm), leaf number plant<sup>-1</sup>, shoot fresh weight (g), shoot dry weight (g), root fresh weight (g) and root dry weight (g). The collected data on growth and dry matter production were analyzed statistically by F-test to examine whether treatment effects were significant or not (Gomez and Gomez, 1984). The mean comparisons of the treatments were evaluated by least significant difference (LSD).

### **Results and Discussion**

**Plant height:** Different types of polybag significantly influenced plant height of three different species (Table 1). Plant height was increased with the increase of days after sowing. The highest plant height was observed in T<sub>1</sub> (23 cm × 15 cm) polybag and lowest in T<sub>3</sub> (17 cm × 11 cm) in case of the three harvests.

**Base diameter:** Data showed significant increase



**Table 1: Effect of different polybag size on the growth parameter of different tree species**

Polybag size	Plant height (cm)			Base diameter (cm)			Leaf number/plant			Shoot fresh wt. (g)			Shoot dry weight (g)			Root fresh wt. (g)			Root dry weight (g)		
	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h.	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h.	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h
23 cm × 15 cm (T <sub>1</sub> )	76.933	93.067	112.333	3.44	4.50	5.10	19.267	27.400	34.067	24.199	37.039	46.848	19.655	31.632	40.682	17.307	23.139	27.154	13.346	19.736	22.732
20 cm × 13 cm (T <sub>2</sub> )	67.667	86.267	103.400	2.81	3.59	4.50	12.667	21.000	26.800	15.530	24.081	34.308	11.967	19.319	29.830	10.205	16.721	22.254	6.376	13.709	18.709
17 cm × 11 cm (T <sub>3</sub> )	58.400	74.267	96.467	2.54	3.24	3.94	9.800	16.467	22.667	9.262	14.139	23.413	7.304	11.239	18.694	6.418	9.426	13.642	3.592	6.729	10.729
Level of sign.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

**Table 2: Combined effect of polybag size and species on the growth parameter of different tree species at three harvest**

Species × Polybag	Plant height (cm)			Base diameter (cm)			Leaf number/plant			Shoot fresh wt. (g)			Shoot dry weight (g)			Root fresh wt. (g)			Root dry weight (g)		
	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h.	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h.	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h	1 <sup>st</sup> h	2 <sup>nd</sup> h	3 <sup>rd</sup> h
S <sub>1</sub> T <sub>1</sub>	72.4	90.2	110.2	3.44	4.82	5.5	10.8	21.2	27	25.39	38.076	47.762	22.543	33.762	41.172	21.552	26.572	31.194	17.702	22.732	26.732
S <sub>1</sub> T <sub>2</sub>	63.2	85	103.2	2.62	3.24	4.86	8	16.2	22.4	17.259	27.245	37.786	13.938	21.696	32.328	10.768	20.843	27.408	7.742	16.884	23.732
S <sub>1</sub> T <sub>3</sub>	54.2	73.2	96.2	2.28	2.92	4.06	7.4	12.8	19.2	9.405	17.441	26.243	7.667	14.556	21.413	6.826	10.819	16.419	3.748	7.79	12.732
S <sub>2</sub> T <sub>1</sub>	78.8	97.8	113.8	3.82	4.58	5.1	22.4	29.4	35.4	31.888	48.511	18.4	25.416	43.425	51.598	18.412	27.326	31.88	14.488	24.025	27.732
S <sub>2</sub> T <sub>2</sub>	64.2	85.4	102.2	3.2	4.18	4.8	13.4	20.4	25.8	18.867	28.763	41.564	14.526	24.401	36.869	11.313	18.856	26.051	7.529	15.962	20.732
S <sub>2</sub> T <sub>3</sub>	55.8	73.8	96.2	3.14	3.92	4.26	9.6	17	21.8	11.334	14.45	26.009	8.223	10.417	21.454	7.092	10.411	15.563	3.691	7.648	12.732
S <sub>3</sub> T <sub>1</sub>	79.6	91.2	113	3.06	4.1	4.72	24.6	31.6	39.8	15.319	24.53	34.383	11.006	17.708	29.278	11.957	15.519	18.378	7.849	12.452	14.732
S <sub>3</sub> T <sub>2</sub>	75.6	88.4	104.8	2.62	3.36	3.86	16.6	26.4	32.2	10.465	16.237	23.574	7.437	11.86	20.292	8.536	10.465	13.302	3.858	8.28	11.732
S <sub>3</sub> T <sub>3</sub>	65.2	75.8	97	2.2	2.9	3.5	12.4	19.6	27	7.048	10.57	17.987	6.024	8.744	13.216	5.336	7.048	8.944	3.339	4.748	6.732
Level of significance	*	*	NS	*	**	*	**	*	**	**	**	**	**	**	*	**	**	**	**	**	**

NS= Non significant

\* Indicates 5% level of significance

\*\* Indicates 1% level of significance

**Tree Species**

S<sub>1</sub> = Kalokoroi

S<sub>2</sub> = Raintree

S<sub>3</sub> = Ipil-ipil

**Polybag Size**

T<sub>1</sub> = 23 cm X 15 cm

T<sub>2</sub> = 20 cm X 13 cm

T<sub>3</sub> = 17 cm X 11 cm

