

PERFORMANCE OF DIFFERENT PROVENANCES OF *PINUS CARIBAEA* VAR. *HONDURENSIS* IN BANGLADESH

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ABSTRACT

Two provenance trials of *Pinus caribaea* var. *hondurensis* were established in randomised complete block design in 1983 and later in 1984 at Keochia Silviculture Research Station, Chittagong, Bangladesh. It was observed that there was no significant difference among the provenances in respect of survival percentage, height and diameter growth and volume yield till December, 1989. All the provenances are doing well in the area. The mean height, diameter at breast height and volume yield per plot of 148.84 m² ranged from 9.5-10.4 m, 12.5-13.8 cm and 1.242-1.663 m³ respectively for the 1982 trial at the age of 7.5 years. The corresponding data for the 1984 trial at the age of 5.5 years were 4.2-5.4 m, 6.0-7.7 cm and 0.102-0.300 m³ respectively.

সারসংক্ষেপ

কেওচিয়া বনচাষ গবেষণা কেন্দ্রে ১৯৮২ ও ১৯৮৪ সালে পাইনাস কেরিবিয়া ভার হন্ডুরেনসিস প্রজাতির দুইটি প্রভিনেন্স ট্রায়াল করা হয়। উক্ত ট্রায়াল হতে সংগৃহীত উপাত্ত বিশ্লেষণ করে দেখা যায় গাছ বাঁচিয়া থাকার শতকরা হার, উচ্চতা ও ব্যাস বৃদ্ধি এবং আয়তন উৎপাদনে ১৯৮৯ সালের ডিসেম্বর মাস পর্যন্ত কোন বিবেচ্য পার্থক্য নাই। ১৯৮২ সালের ট্রায়ালে ৭.৫ বৎসর বয়সে গাছের উচ্চতা, ব্যাস ও ১৪৮.৮৪ বর্গ মিটারের প্রতি প্রটে উৎপাদন ছিল যথাক্রমে ৯.৫-১০.৪ মি, ১২.৫-১৩.৮ সেমি এবং ১.২৪২-১.৬৬৩ ঘন মিটার। ১৯৮৪ সালের ট্রায়ালে ৫.৫ বৎসর বয়সে উপরোক্ত উপাত্তগুলি ছিল যথাক্রমে ৪.২-৫.৪ মি, ৬.০-৭.৭ সেমি এবং ০.১০২-০.৩০০ ঘন মিটার।

INTRODUCTION

Bangladesh has got no long-fibre species of her own, but she does have a sufficient number of short fibre species. For making high quality paper, a certain quantity of long-fibre pulp is needed. Bangladesh has to import a large amount of long fibre pulp every year. To overcome this shortage, the Bangladesh Forest Research Institute, Chittagong (BFRI) has been

trying to find out suitable *Pinus* species and provenances since 1960's. In the initial elimination trials, *P. caribaea* var. *hondurensis* was found satisfactory (Das, 1977; White, 1979). BFRI therefore took up *P. caribaea* var. *hondurensis* provenance trials in 1982 and 1984 at Keochia, Chittagong to select the suitable provenances for Bangladesh.

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Pinus caribaea var. *hondurensis* is well known for its proven capacity for long fibre pulp production. The timber of the species is good for general construction purposes and is also used for chipboard and plywood manufacturing. The resin obtained from the sapwood is used for producing turpentine, rosin and associated products.

MATERIALS AND METHODS

The seeds of seven provenances of *Pinus caribaea* var. *hondurensis* were supplied by the Oxford Forestry Institute, U. K. in the year 1980. A second batch of seeds of eight provenances of the same species were supplied by DANIDA forest seed centre, Denmark in the year 1983. The geographic locations and climatic data of the places of seed origin are given in Table 1. The seedlings of the first batch were raised in 1981 and for the second batch in 1984 at the central nursery of BFRI. For raising the seedlings, soil was collected from the pine plantations of the BFRI campus and prepared following the methodology described by White (1979). The polythene tubes of size 23 cm x 15 cm were filled up with the prepared soil and one seed was sown in each bag after a floating test.

The seedlings of the first batch were planted at Keochia Silviculture Research Station in a randomized complete block design (RCBD) in 1982 at the age of one and a half years. The seedlings of the second batch were planted in a RCBD at the same station in 1984 at the age of six months. Twenty-five seedlings were planted in each plot at a spacing of 2.4 m X 2.4 m for the 1981 batch while forty nine seedlings per plot were planted at the same spacing for the second batch. Records of the 25 seedlings were maintained. Each of the measurement plots had an area of 148.84 m². The survivals and heights were recorded at six months intervals for the initial three years and subsequently survivals, heights and diameters at breast height (dbh) were recorded at an interval of one year. This paper deals with the

performance of the provenances at the age of 7.5 and 5.5 years for the 1982 and 1984 trials respectively.

The survivals, mean height and dbh of the mean basal area tree for each plot were calculated first. Then the volume per tree was estimated by using the volume equation derived by Latif (1992). The volume of the mean tree was multiplied by the number of trees per plot to get the volume yield per plot. Data were analysed by using the formulae described by Gomez and Gomez (1976).

RESULTS AND DISCUSSION

The survival percentages, mean height and mean dbh were calculated and analysed following the procedure Gomez and Gomez (1976). The analyses revealed that there was no significant difference for these parameters among the provenances tried.

As there was no significant difference among the provenances in respect of survival percentages, mean heights and mean dbhs, the volume yield was calculated and analysed to see whether there is any difference among the mean volume production. It was, again, observed that there was no significant difference among the volume yield.

The survival percentages, mean height, dbh and volume yield per plot are given in Table 2. The mean height, dbh and volume yield per plot of 148, 84 m³ ranged from 9.5-10.4 m, 12.5-13.8 cm and 1.242-1.663 m³ respectively for the 1982 trial at the age of 7.5 years. The corresponding data for the 1984 trial at the age of 5.5 years were 4.2-5.4 m, 6.0-7.7 cm and 0.102-0.300 m³ respectively.

The survival percentage, mean annual dbh, height and volume increments of 1982 trial were higher compared to those of 1984 trial. These may be due to the fact that the soil of the 1984 trial site was comparatively compact and dry.

The stem of the trees of all the provenances were found in good form. Fox tailing was observed in very few trees. The trees grew well in slope and top of the hills.

The mean height and mean dbh of the same species (provenance unknown) from the block plantations at

Keochia were also compared and observed that the growth rates were similar (Table 3).

Table 1. Geographic and climatic information of the provenances of *Pinus caribaea* var. *hondurensis* planted at Keochia, Bangladesh.

Store No.	Provenance site	Long. (W)	Lat. (N)	Rainfall (MM)	Temperat. °C	Altitude (M)
21/85 (bulked 15/76, 37/71, 14/81)	Culmi, Honduras	85°33'	15°05'	1325	19-30.2	420-540
16/85 (7/79, 16/82, 6/74, K106)	Alamicamba, Nicaragua	84°17'	13°34'	2900	20-31	20
85/73 or 17/85 (85/79)	Mt. Pine Ridge, Belize	88°55'	17°00'	1558	23.9	400
22/85 (88/79, 12/78, 89/79)	Poptun, Guatemala	89°25'	16°21'	1688	20-26.6	500
13/76	Yojoa, Honduras	87°54'	14°58'	2995	-	500-700
20/85 (16/81, 32/81, 12/76)	Trojes, Honduras	85°58'	14°03'	1649	23.0	680-760
18/85 (13/81, 35/81, K124, bulked 24/75)	Los Limones, Honduras	86°42'	14°03'	663	22.2	700
1033/83	Alamicamba, Nicaragua	84°17'	13°34'	1440	-	20
5515	Culmi, Honduras	85°37'	15°06'	1441	18-26	600-800
5518	San Carlos, Honduras	85°50'	15°18'	1500-1600	-	350-450
5527	La Mosquitia, Honduras	83°46' -84°20'	14°43' -15°20'	2863	24-28.2	11-170
5517	La Brea-Colon, Honduras	86°05'	15°45'	1200-1300	-	40-60
1033/82	Alamicamba, Nicaragua	84°17'	13°34'	2610	25.7-28.5	10
1067/82	Prasala, Fiji (origin Mt. Pine Ridge, Belize)					
5516	Poptun,	89°25'	16°21'	1700	20-27	230-250

Table 2. Performance of Different provenances of *P. caribaea* var. *hondurensis* in Bangladesh

Seed source No.	Survival (%)	Mean height (m)	Mean dbh (cm)	Mean volume yield (m ³) per plot of 148.84 m ²
<i>Pinus caribaea</i> var. <i>hondurensis</i> 1982 trial				
15/76	84.0	10.3	13.8	1.663
6 / 74	86.4	9.6	12.7	1.381
85/79	85.6	10.4	13.6	1.662
13/76	86.4	9.6	12.8	1.401
12/78	84.0	10.3	13.6	1.618
12/76	80.8	9.5	12.5	1.242
24/74	84.0	10.3	13.7	1.640
Grand mean	84.5	10.0	13.24	1.515
Sd. error	0.74	0.15	0.21	0.065
<i>Pinus caribaea</i> var. <i>hondurensis</i> 1984 trial				
1033/83	57.2	4.7	7.0	0.165
5515	48.0	5.4	6.8	0.147
5518	58.8	5.0	7.1	0.184
5527	58.8	4.8	6.9	0.168
5517	52.0	5.0	7.2	0.167
1033/82	78.8	4.6	7.1	0.229
1067/82	52.0	4.2	6.0	0.102
5516	80.0	5.2	7.7	0.300
Grand mean	60.7	4.9	7.0	0.183
Sd. error	4.29	0.13	0.17	0.021

Table 3. Height and dbh growth of *Pinus caribaea* var. *hondurensis* in block plantations at Keochia

Year of Plantations	Age (yrs)	Height (m)	Dbh (cm)	Overall mean in the Provenance trials	
				Height (m)	dbh (cm)
1981	7.5	10.1	11.8	10.0	13.24
1982	7.5	10.3	13.5		
1983	5.5	5.5	7.0	4.9	7.0
1984	5.5	5.0	6.9		

An attempt was also made to compare the mean height of the available provenances of the international provenance trials of the neighbouring

countries (Table 4). It was observed that the mean height of different provenances in Bangladesh is within the range of those countries (Greaves, 1980).

Table 4. Height growth of some provenances of *Pinus caribaea* var. *hondurensis* at various neighbouring countries to Bangladesh

Location	Heights (m) of the provenances with numbers					Age (Years)
	16/85	18/85	21/85	22/85	17/85	
Chiang Mai, Thailand 1972	1.8	1.6	1.5	1.6	-	3.5
Cumpon, Thailand 1972	6.6	-	5.4	6.0	-	3.5
Ketawa, Sri Lanka 1973	3.3			3.4	-	3.5
Ginigatgala December	2.6		-	1.9	-	3.5
Diyatalawa December	1.4		-	1.2	-	3.0
June	3.7	2.5	-	3.7	3.2	3.5
December	1.6	1.4	-	1.6	1.2	3.0
December	2.6	2.3	-	2.3	1.5	3.0
Kemasul, Malaysia 1973	8.2			7.7	7.0	4.0
Bahan 1973	3.5		-	3.6	3.6	4.0
Perak 1972	7.6		-	6.7	6.1	4.0
Tapah 1973			-	4.8	-	3.0
Keochia, Bangladesh 1982	4.4	4.4	4.6	4.0	4.5	4.0

From the results of these trials, it appears that the provenances of *Pinus caribaea* var. *hondurensis* did not differ significantly in respect of survival percentages, heights, dbh growth and volume yield. But, all the provenances are performing well. Zashimuddin *et al.* (1991) also reported that *Pinus caribaea* var. *hondurensis* is doing better in comparison to *Pinus oocarpa* at the same location. Therefore, if it is desired, trial plantations may be raised with the provenances for further study.

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