

# EFFECT OF TREE HEIGHT AND RADIAL DISTANCE ON PHYSICAL PROPERTIES OF *EUCALYPTUS TERITICORNIS*

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## ABSTRACT

Physical properties, such as, specific gravity, volumetric shrinkage and moisture content of *Eucalyptus teriticornis* have been studied from the pith to periphery and bottom to top position. Results show that specific gravity increases radially from the pith to outward, but decreases near the periphery. On the other hand, specific gravity increases significantly as the height increases. In the case of volumetric shrinkage, no such trend of variation has been observed. Moisture content decreases significantly from the bottom to top, whereas it does not show any change from the pith to periphery.

## সারসংক্ষেপ

ইউক্যালিপটাস টেরিটিকরনিস প্রজাতির কাঠের মজ্জা হতে প্রান্ত এবং গোড়া থেকে আগা পর্যন্ত কিছু ভৌত ধর্ম যথা, আপেক্ষিক গুরুত্ব, আয়তনিক সংকোচন ও জলীয় অংশের পরিবর্তন পরীক্ষা করা হয়েছে। উপস্থিত হতে দেখা গেছে যে, মজ্জা থেকে ব্যাসার্ধ বরাবর আপেক্ষিক গুরুত্ব বৃদ্ধি পায়, কিন্তু প্রান্তের দিকে আবার হ্রাস পায়। অপর পক্ষে উচ্চতা বৃদ্ধির সাথে সাথেও আপেক্ষিক গুরুত্ব বৃদ্ধি পায়। আয়তনিক সংকোচনের ক্ষেত্রে কোন নির্দিষ্ট নিয়ম পরিলক্ষিত হয়নি। কাঠের জলীয় অংশও তাৎপর্যপূর্ণভাবে গোড়া থেকে আগার দিকে হ্রাস পায়, পক্ষান্তরে মজ্জা থেকে প্রান্তের দিকে কোন নির্দিষ্ট নিয়ম পরিলক্ষিত হয়নি।

## INTRODUCTION

*Eucalyptus teriticornis* is one of the important exotic tree species introduced in Bangladesh. To meet the increasing demand of timber, attention is recently concentrated towards the fast growing species. But limited information regarding physical and mechanical properties is available in this species. Since specific gravity is the prime single indicator of wood properties, an attempt has been made to study the variation of specific gravity from the

pith to periphery and from the bottom to top. It may provide a useful information for the complete utilization of the species. The volumetric shrinkage and moisture content have also been included in this investigation.

Some studies were carried out in the USA, England, Australia, Canada and India to ascertain the variation of specific gravity from the pith to periphery for different species grown

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in their respective countries. Sekhar and Negi (1961) studied six species and found that specific gravity increased radially from the pith to onwards and near periphery it decreased in four species, viz., *Tectona grandis*, *Shorea robusta*, *Cedrus deodara* and *Machilus macrontha*; but other two species, *Dipterocarpus grandiflorus* and *Pinus roxburghii* did not show any regular trend. Rajput, Shukla and Sharma (1983) also reported that the specific gravity of kokko (*Albizia lebbek*) increased from the pith and near periphery it again decreased. The radial pattern of specific gravity variation differed not only between the species but also within the species and even within the stem (Bhat et al 1989). Zobel, Webb and Hension (1959) found that specific gravity near the pith region tends to vary inversely with the height about 10 ft from the bottom of the tree and then became relatively constant all the way in loblolly and slash pines. Zobel and Maclwee (1958) reported that juvenile wood had lower specific gravity than the outer wood of loblolly pine. Wilkes (1989) also found that specific gravity increased appreciably in the centrifugal direction in *Pinus radiata*. Gonzalez (1989) recorded that inner wood had lower specific gravity than the outer

wood in lodgepole pine. Manwiller (1979) also noted different trends in different species.

## MATERIALS AND METHODS

Three trees of *Eucalyptus teriticornis* were collected from the silvicultural Research Centre, Charaljani of the Bangladesh Forest Research Institute. The age of the trees was about 12 years and the average height and diameter were 8.3 m and 0.20m respectively. Each tree was divided into three equal portions, viz., bottom, middle and top and then one disc of 10 cm thickness was taken from each portion. The samples were selected in three radial distances, viz., pith, intermediate and periphery. Specific gravity was determined on the basis of oven-dry weight and green volume. The volumetric shrinkage was determined from the green dimension to oven-dry dimension.

## RESULTS

Specific gravity, moisture content and volumetric shrinkage are shown in Figs. 1, 2 and 3 respectively. Analysis of variance was done following the 3 x 3 x 3 factorial design and the summary of the result is presented in Table 1.

**Table 1.** Summary of analysis of variance of specific gravity, moisture content and volumetric shrinkage of *Eucalyptus teriticornis*

Source of variation	df	Specific gravity	Moisture content (%)	Volumetric shrinkage
Replication	2	*	*	*
Radial distance	2	*	*	*
Height position	2	*	*	ns

\* Significant at the 5% level of probability  
ns Not Significant

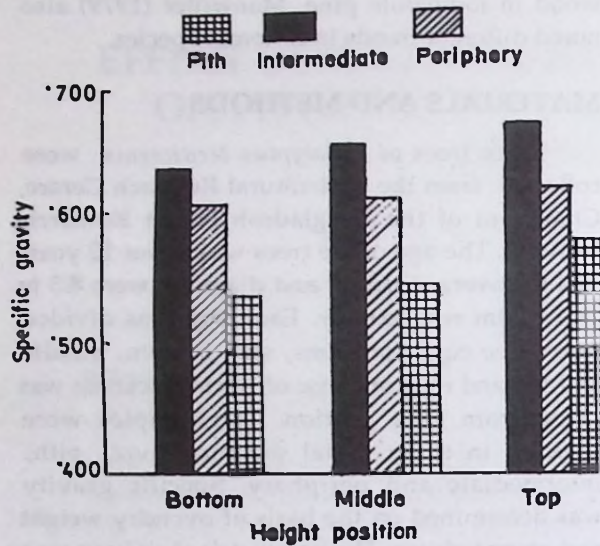


Fig. 1: Specific gravity of *Eucalyptus teriticornis* at different height and radial distances

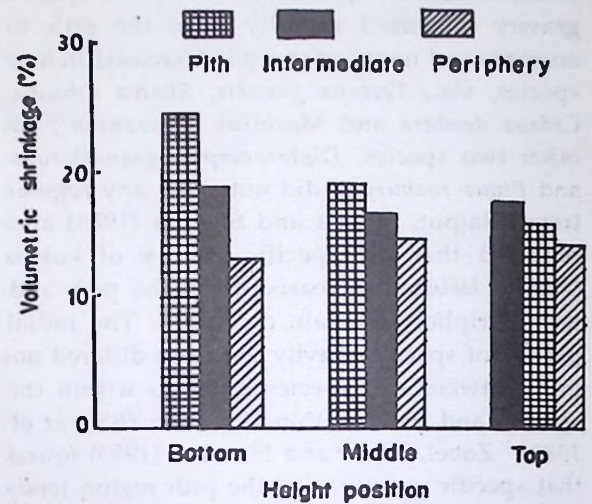


Fig. 3: Volumetric shrinkage of *Eucalyptus teriticornis* at different height and radial distances

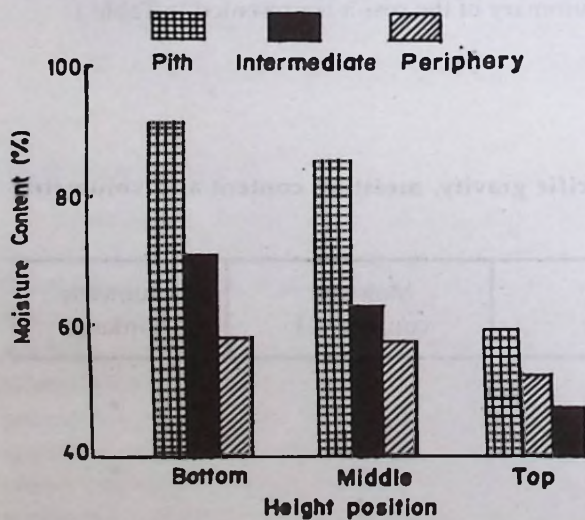


Fig. 2: Moisture content of *Eucalyptus teriticornis* at different height and radial distances

## DISCUSSION

Figures 1-3 show the variations of specific gravity, moisture content and volumetric shrinkage from the pith to periphery and from the bottom to top regions. It is apparent that the radial variation of specific gravity was significant (Table 1). The specific gravity increased from the pith to intermediate wood then decreased in this species. The intermediate wood possessed the maximum specific gravity whereas the pith exhibited minimum specific gravity. The variation of radial pattern of specific gravity agreed well with those of Indian and American hardwood species (Sekhar and Negi 1961 ; Bhat *et al* 1989, Wiemann and Williamson, 1989). In conformity with other workers, the specific gravity was observed to increase with distance from the pith but near the periphery it again decreased (Brown *et al* 1949).

The specific gravity was found to increase significantly from the bottom to top (Fig. 1 & Table 1). In India, Bhat *et al* (1990) observed

the different trend in specific gravity from bottom to top of some species. They found that specific gravity increased in *Anacardium occidentale*, *Grewia tiliifolia*, *Dipterocarpus indicus*, *Erythrina stricta* and *Lagerstroemia microcarpa* but decreased in *Dillenia pentagyna* and *Xylia xylocarpa*. Another trend was also noted that specific gravity of *Tectona grandis* and *Ilevea brasiliensis* was first decreased from the bottom to middle and then attained the highest value in the top. However, Manwiller (1979) found that wood specific gravity remained relatively constant or to decreased with increasing height but the relationship varied considerably among the species.

No definite trend was observed for moisture content from the pith to periphery, but the pith contained higher moisture content (Fig. 2). It was, however, observed to decrease significantly from the bottom to top (Table 1).

The volumetric shrinkage (from the green to oven-dry dimension) varied significantly from the pith to periphery, but from the bottom to top the variation found insignificant (Fig. 3 & Table 1). The pith showed higher volumetric shrinkage but no definite pattern was found in this property.

## CONCLUSIONS

i) The specific gravity increases significantly radially from the pith, but near the periphery it decreases. As the height increases, the specific gravity has been found to increase significantly.

ii) The moisture content decreases significantly from the bottom to top, but no definite trend of variation has been found from the pith to periphery.

iii) The volumetric shrinkage values vary significantly, but no general trend has been observed.

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