

SUITABILITY OF SUBABUL (*LEUCAENA LUCOCEPHALA*) DUST FOR PREPARATION OF PARTICLEBOARD

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Abstract

Suitability of Subabul (*Leucaena lucocephala*) as a raw material for particle board manufacture has been evaluated. Subabul (*Leucaena lucocephala*) is a promising source of lignocellulosic material used now days for particle board manufacture. The result showed that Subabul (*Leucaena lucocephala*) is suitable for making particle board. Satisfactory board were made using 12 per cent and 14 per cent phenol formaldehyde resin and 0.5 per cent wax emulsion as sizing agent. The particle boards met the requirement in respect of physical properties as specified in IS: 2380 and IS: 3087.

Key Words: - Wood, Subabul, Particleboard

Introduction

A Particle board is a board or sheet constituted from fragments of wood and other lignocellulosic materials, bonded with organic binders with the help of one or more agents like heat, pressure, humidity, catalyst, etc.

The problem of the shortage of the wood as raw material is becoming very severe day by day. *Leucaena lucocephala* trees growing throughout the country and it is easily available in large quantities is one such lignocellulosic wood material can be utilized for the preparation of the particle board.

Leucaena lucocephala has been the focus of a great deal of research in the past few decades. This species is native to Central America and it has been planted in many tropical countries, including south-east Asia and Africa, as a shade tree for commercial crops, alley cropping or agroforestry for wood production. *Leucaena lucocephala* is a multipurpose tree of great importance in the tropics region.

The species has limited value as a timber source, though it is suitable for light construction, boxes, fencepost, particleboard, and pulp. It also can be used for parquet flooring and small furniture. *Leucaena* poles are useful for posts, props and frames for various climbing crops.

Materials and Method

Leucaena leucocephala as a wood raw material collected from the campus of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The woody raw material was cut into small pieces with the help of cross cutting machine (Mini Combi planner) and then sun drying to remove excess moisture. The dried small cross cut pieces was further reduced with the help of wood grinder to convert into small particles. The procured materials were sun dried for 8 to 15 days, so as to bring down the moisture level up to 11 to 12 per cent.

About 500 g of dried sawdust was taken for making each particle boards. The dried sawdust was uniformly blended with different resin content i.e. 6, 8, 10, 12 and 14 per cent on the basis of dried particles of *Leucaena leucocephala* and solid content of phenol formaldehyde resin. The resin blended particles were air dried to bring down the moisture content of about 10-12 per cent. Then the resin blended particles were uniformly laid to form mats in a wooden mould. The mats were pressed in the hydraulic hot press at specific pressure of 300 lbs/inch² and gauge pressure of 91.86 lbs/inch² at temperature of 150 to 155^oc for about 12 minutes for making each particle boards. The single layers flat pressed particle boards were made.

Particle boards thus obtained were conditioned at room temperature for one week before preparation of test specimens and then tested for various physical properties such as thickness variation, density, moisture content, water absorption, length and thickness swelling and swelling due to surface absorption as per IS : 2380 and IS : 3087.

Results and Discussion:

The various physical properties of particle board from Subabul (*Leucaena lucocephala*) are given in table 1.

Table 1: Physical properties of particle boards from *Leucaena leucocephala* .

Amount of resin used (%)	Thickness of the board (mm)	Moisture content of the board (%)	Density (g/cm ³)	Water absorption 2 hrs (%)	Water absorption 24 hrs (%)	Length swelling 2 hrs (%)	Thickness swelling 2 hrs (%)	Swelling due to surface absorption 2 hrs (%)
6	8.9	8.7	0.62	55.88	79.52	0.58	21.08	18.21
8	8.3	8.1	0.67	46.85	71.83	0.54	19.32	14.70
10	7.6	7.3	0.74	40.63	65.71	0.52	12.80	11.46
12	7.2	6.8	0.78	24.91	47.50	0.48	9.65	8.83
14	7.0	5.9	0.81	22.51	41.91	0.32	8.43	8.14
Requirement of IS:3087 (1985)	-	5 to 15	0.5-0.9	≤ 25	≤ 50	≤ 0.50	≤ 10	≤ 09.00

The result in table 1 shows that Thickness of the board varied from 7.0 mm to 8.9 mm while, moisture content varied from 5.9 to 8.7 per cent. Maximum thickness and moisture content was recorded in the board prepared with 6 per cent resin content whereas, minimum thickness and moisture content was observed in the boards prepared from 14 per cent of resin content. Density of the particle board varied from 0.62 to 0.81 g/cm³. Maximum density was recorded in boards prepared from 14 per cent of resin content whereas, minimum density was recorded in boards prepared from 6 per cent of resin content. Water absorption test of the boards for 2 hours and 24 hours soaking in water varied from 22.51 to 55.88 per cent and 41.91 to 79.52 per cent, respectively. Boards prepared from 12 and 14 per cent resin content met the requirement of IS specifications. Increase in the amount of resin showed decrease in water absorption property. Highest value (0.58 %) of length swelling was recorded in the boards prepared with 6 per cent resin content and lowest (0.42 %) in the boards prepared from 14 per cent resin content. The values obtained for length swelling were exceeded the minimum requirement as specified in the specification in the board prepared from 6 to 10 per cent of resin content. Maximum thickness swelling was recorded in the boards made from 6 per cent resin content and minimum value of 8.43 per cent in the board made from 14 per cent resin content. The values reported for thickness swelling of the board prepared from 12 and 14 per cent resin content met the requirement of IS specification. Swelling due to surface absorption after 2 hours ranges between 8.14 to 18.21 per cent. The maximum swelling due to surface absorption was observed in the board prepared from 6 per cent resin content and minimum swelling due to surface absorption was observed in the board prepared from 14 per cent resin content. The values obtained for swelling due to surface absorption decreases as amount of resin increases. Satisfactory boards were prepared from 12 and 14 per cent phenol formaldehyde resin met the requirement in respect of physical properties as specified in IS: 3087 (1985).

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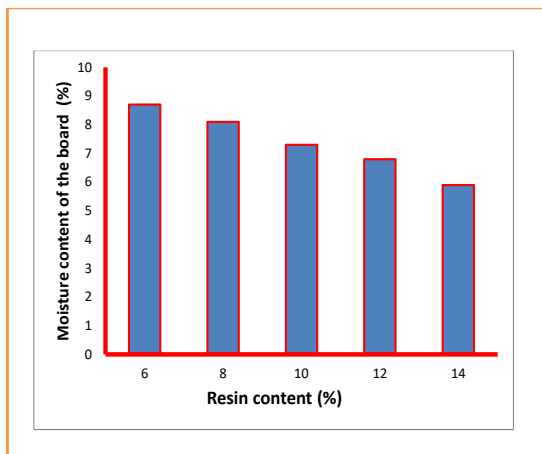


Fig 1. Relationship between amount of Resin content (%) and Moisture content of the board(%)

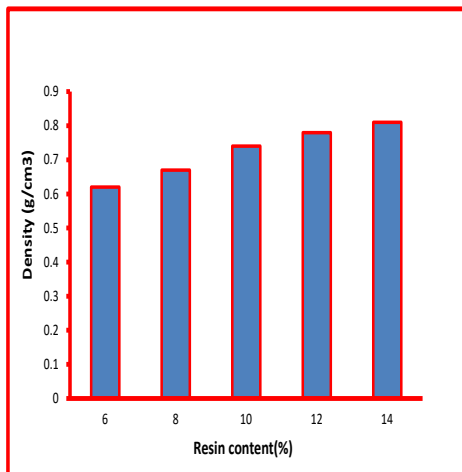


Fig.2 Relationship between amount of Resin content (%) and Density (g/cm3).

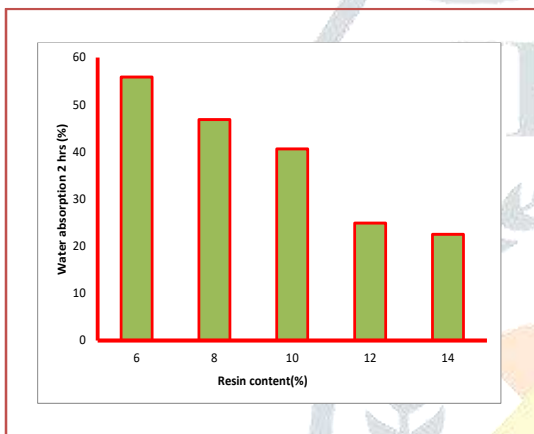


Fig 3. Relationship between amount of Resin content (%) and Water absorption 2 hrs (%).

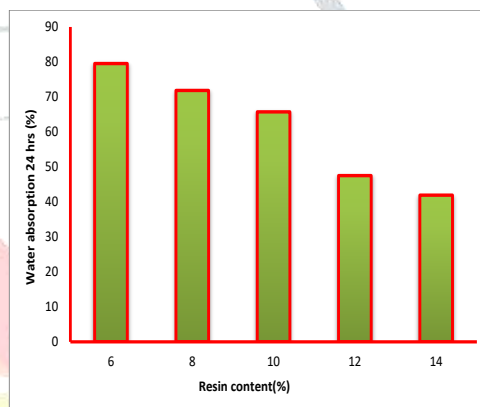


Fig 4. Relationship between amount of Resin content (%) and Water absorption 24 hrs (%).

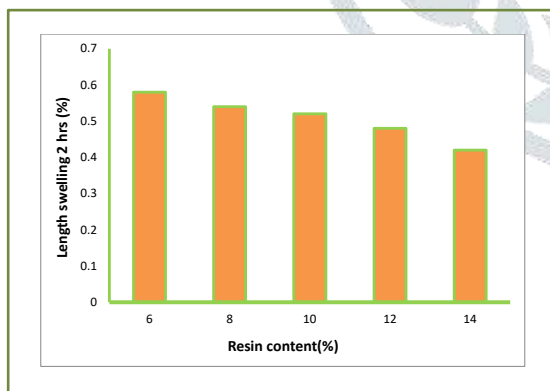


Fig 5. Relationship between amount of Resin content (%) and Length swelling 2 hrs (%).

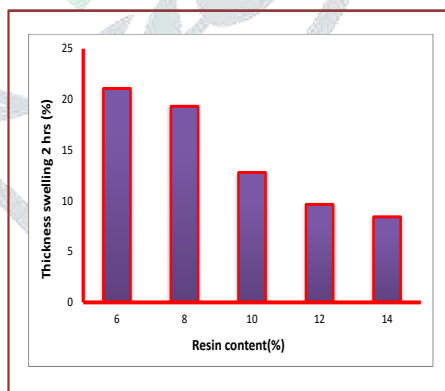


Fig 6. Relationship between amount of Resin content (%) and Thickness swelling 2 hrs (%).

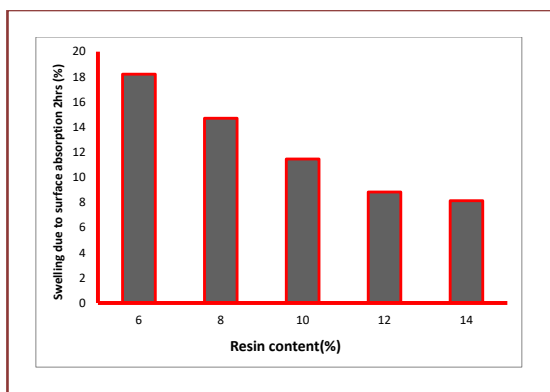


Fig 7. Relationship between amount of Resin content (%) and Swelling due to surface absorption 2 hrs (%).

