

# Effect of Mechanical Properties of Composites of Teak Wood & Tamarind Kernel as Reinforced Particulates with Polyester Resin

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**Abstract:** Now-a-days many of the scientists/researchers are focusing on the natural fibers due to their inherent to replace synthetic fiber in many of the initial applications & unique properties. Natural fiber, particulates have good mechanical properties compared to synthetic fibers. The natural fibers as bio-degradable. In this experiment work has done on effect of mechanical properties of composites of teak wood & tamarind kernel as reinforced particulates with polyester resin. The properties of polyesters offer simplicity of dealing with, dimensional solidness & great compound protection & electrical properties, coming to teak wood they are dimensional dependability, common toughness, dampness content shows outer impacts. In this work to analyze their mechanical behavior of different type of combination of composite material, with different tests such as tensile test, hardness test & flexural bend test. Finally it is reported that more value in the combination of tamarind dust on flexural bend test. Coming to hardness test it reported more value in teak wood dust & at last in tensile test it varies at different combinations.

**Keywords:** *natural fibers, teak wood, tamarind kernel, polyester resin, mechanical properties.*

## 1. INTRODUCTION

Nowadays, scientists & engineers focusing on composite materials due to natural material advantages as differentiate to metal alloys. Composites materials mean at least two artificially extraordinary constituents joined visibly to get a valuable material. In these composites, it consists two phases' reinforcement & matrix.

- Fibers & whiskers are held together by a binder are known as a matrix. In general most of the composites comprise a bulk material as a matrix & reinforcement added primarily to raise the stiffness & strength of the matrix.
- In some cases, fillers or modifiers might be added to get smooth manufacturing process, & reduce product cost.

### Fibers reinforcement

**Matrix Phase:** The matrix phase mainly contains the bulk part of a composite. The stringy shape materials are seen that demonstrating great quality property & to accomplish great quality str&s ought to be fortified by a lattice. It may consist one basic material type instead of three materials mainly polymers, ceramics, & metals.

**Reinforcement phase:** The reinforcement is mainly important to get strong composite to improve its mechanical properties. Different types of fibers are used in composites to get distinct properties & so influence the properties in dissimilar ways. It also yields stiffness to the composites.

## 2. MATERIALS & METHODS:

This unit explains the details of processing of experimental process & the composite Followed by their mechanical characteristic features.

The materials used in this work are:

- ❖ Teak wood dust
- ❖ Tamarind kernel powder
- ❖ K-type polyester resin
- ❖ Hardener
- ❖ Catalysts

### Method of Specimen preparation:

Tamarind kernel powder & teak wood dust are reinforced with polyester k-type resin, this resin is belonging to the polyester family is utilized as the matrix material. Tamarind kernel powder made by us, first we took tamarind seeds & remove the shell/husk after roasting the seeds & at last grind the seeds according to required size particles. We got teak wood dust from a local supplier. Remove the moisture of teak wood & tamarind kernel powder. Also, the polyester k-type resin & hardener are

provided by a local supplier. This manufacturing process is carried out by h& layup technique. Hardener & curing polyester resin is taken in the form of the ratio. Three types of composites have been produced with three different combinations.

- In the first combination out of 250gms wt the ratios of weight of materials taken as 15% Wt of tamarind kernel powder & 85% Wt of k-type polyester resin.
- In the second combination out of 250gms wt the ratios of weight of materials taken as 15% Wt of teak wood dust & 85% Wt of k-type polyester resin.
- Coming to the last combination out of 250gms wt the ratios o weight of materials taken as 10% Wt of tamarind kernel powder, 10% Wt of teak wood dust, & 80% Wt of k-type polyester resin.

While doing stir well without any lumps, & pour in mold. Here we took plastic box as a mold box & pour it after 24 hrs at room temperature it cured. Remove from the mold after process completed. & then cut the specimens according to required dimensions for mechanical testing.

### Designations of Composite Materials:

| Composites | Compositions   |
|------------|--|
| A1         | Tamarind kernel powder (15wt %) + K-type polyester resin (85wt %)                          |
| A2         | Teak wood dust (15wt %) + K-type polyester resin (85wt %)                                  |
| A3         | Tamarind kernel powder (10wt %) + Teak wood dust (10wt %) +K-type polyester resin (20wt %) |

**Tablt-1:** specimen's concentration



Fig-1: Tamarind kernel powder Fig-2: Teak wood dust

Specimens:

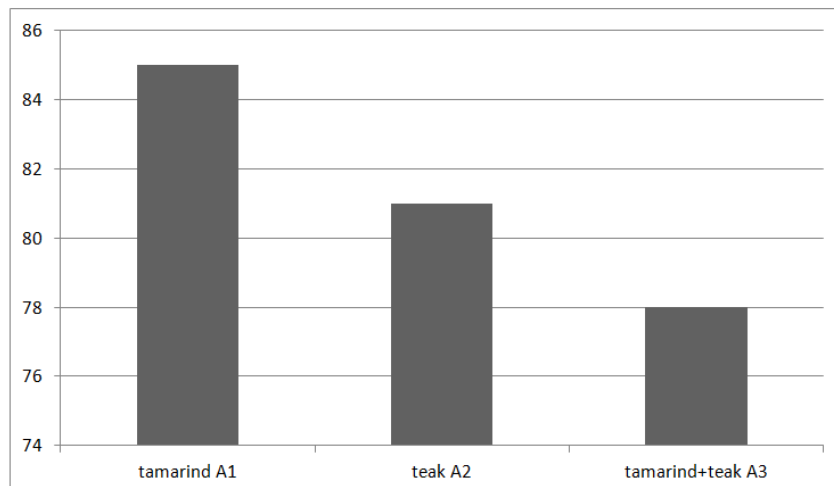


Fig-3: Tests specimen

### 3. RESULTS:

#### Effect of different types of combinations on hardness test before heating:

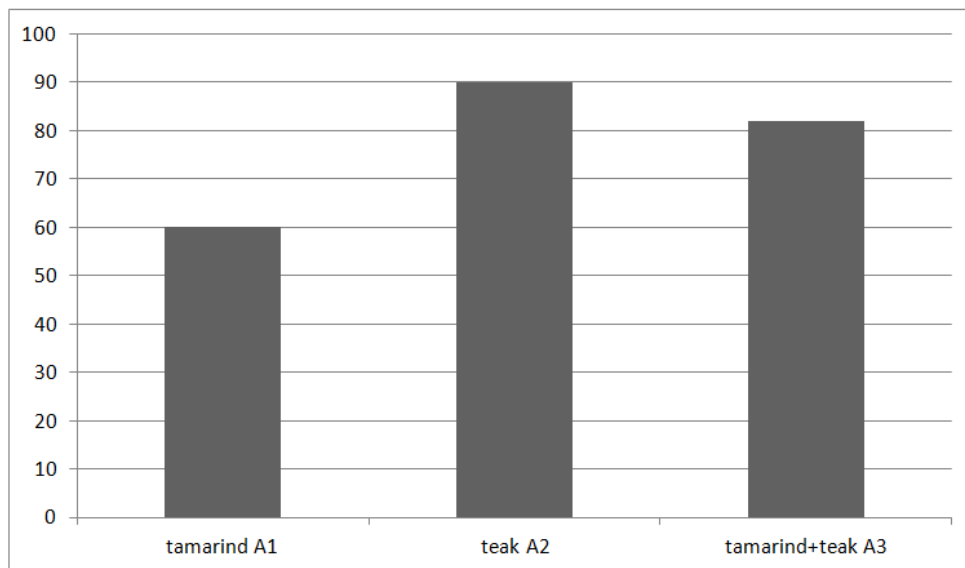
The three composites of measured hardness values are shown in the figure. The hardness value of teak wood dust filled K-type polyester resin is more as compared to tamarind kernel powder & the combination of tamarind + teak. Among three different types of combination, the tamarind kernel combination showed less hardness value.



Graph-1: hardness test results before heating.

**Effect of different types of combinations on hardness test after heating:**

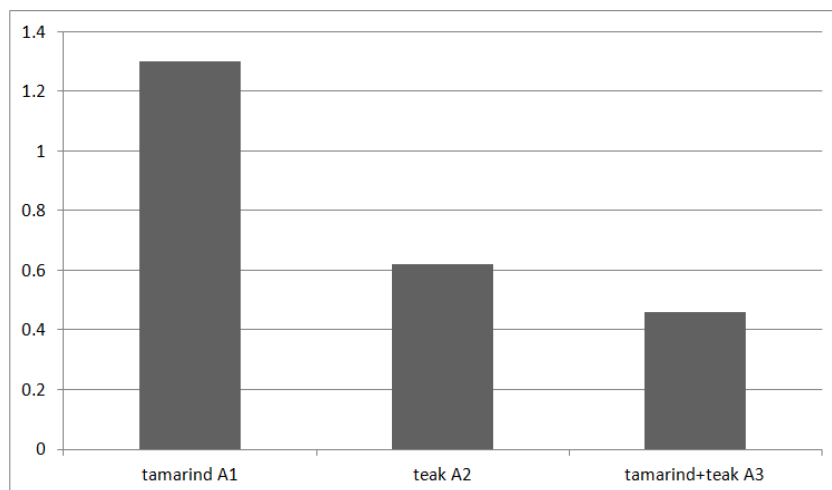
Coming to the hardness values of the specimen after heating also is shown in the figure. In this, the combination of teak wood dust filled K-type polyester resin is more as compared to remaining two combinations. Tamarind kernel powder showed less hardness value.



Graph-2: hardness test results after testing.

**Effect of different types of combinations on flexural bend tests:**

In this, flexural tests tamarind kernel powder with polyester resin reported more value than the teak wood dust & combinations of teak wood dust + tamarind kernel powder. The less value reported by the combination of tamarind & teak wood dust.



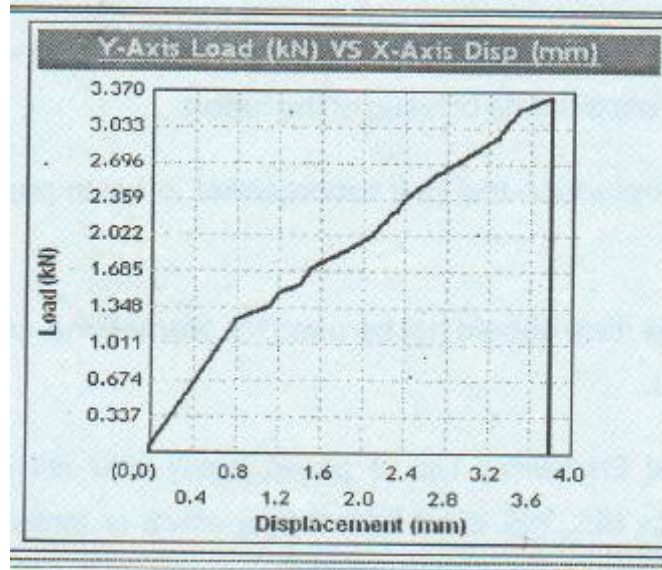


Graph-3: flexural bend test results.

**Effect of different types of combinations on tensile test:**

**A. Combination of tamarind:**

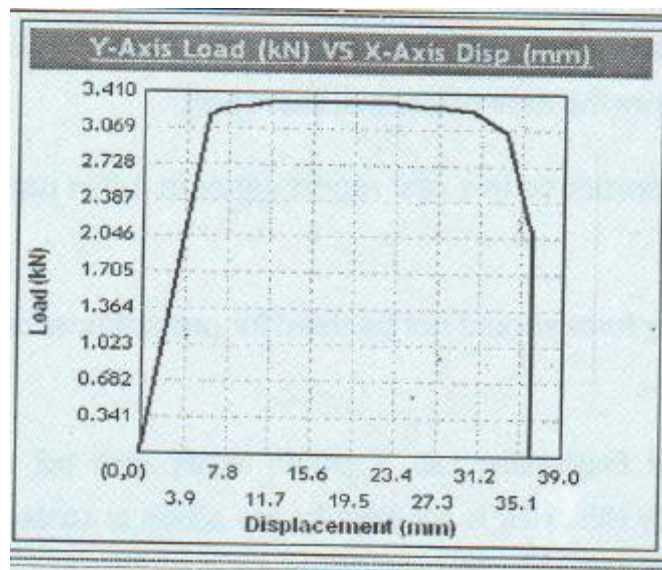
In this, the result showed that ultimate load at 3.320KN, ultimate tensile strength at  $19.054\text{N/mm}^2$ , elongation % = 1.800, yield load at 2.400KN & yield stress at  $13.774\text{N/mm}^2$ .



Graph-5: tensile test results

**B. Combination of teak:**

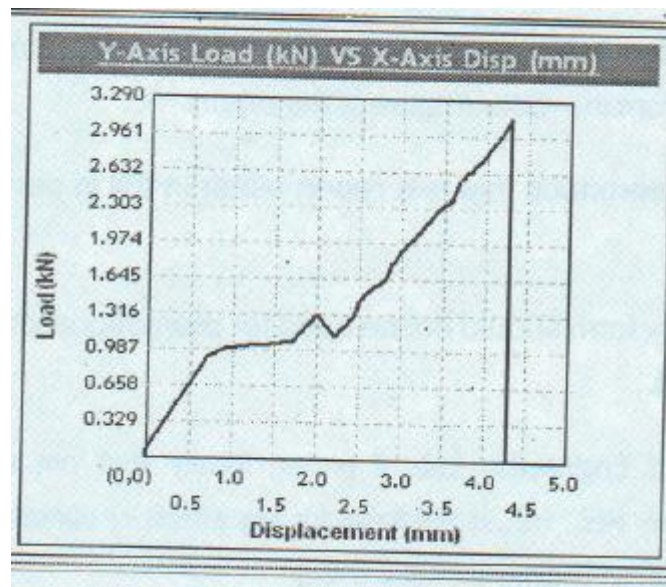
In this, the result showed that ultimate load at 3.360, ultimate tensile strength at  $18.671\text{N/mm}^2$ , elongation % = 1.720, yield load at 3.200KN, yield stress at  $17.782\text{N/mm}^2$ .



Graph-6: tensile test results

### C. Combination of teak & tamarind:

In this, the result showed that ultimate load at 3.240KN, ultimate tensile strength at  $14.792\text{N/mm}^2$ , elongation % = 2.080, yield load at 3.040KN, yield strength at  $13.879\text{N/mm}^2$ .



Graph-7: tensile tests results

### 4. CONCLUSIONS:

In this venture, we infer that the work indicated effective manufacture of wood tidy & tamarind portion powder filled K-sort polyester sap with various sorts of blends, by h& layup method. In this, we saw that the mechanical properties of composites, for example, hardness, extramural twist test & ductile trial of composites are enormously affected.

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