1st Interim Report on "Modification and efficacy study of wood protector, the eco friendly wood preservative for glue line treatment during manufacture of plywood"

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Project Title : **Modification and efficacy study of wood protector, the eco friendly wood preservative for glue line treatment during manufacture of plywood**

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Wood Protector ™

An Eco-Friendly GLP (Wood Preservative).

1.0 INTRODUCTION

Wood Protector ™ is an ideal Wood Preservative which can be used both internally & externally (during mfg. of engineered wood ,viz. Plywood ,Block-Board ,Flush Doors of all grades as well as wood Coating) ,which gives WOOD the best ever protection from **Wood Enemies** (Borer-Marine ,Termite ,Fungus and other micro-Organism).

The application of organic preservative is limited due to **their high price, single spectrum, low solubility, leachability, high toxic to human life & not easy to handle during plywood production,** That's why the need of an eco-friendly wood preservative is required to meet the demand for plywood industries so that it would be **less toxic to human being & more toxic to wood destroying organism.**

On the other hand preservative must provide an adequate protection without sacrificing mechanical & physical properties to the wood panel.

Wood Protector ™ is a totally an **Eco-Friendly** product based on Natural Plants/Herbs ,plenty available in our country ,that is why It is very **user-friendly & more effective** compare to contemporary organic and others which are purely chemical .

The Poly-Phenolic group extracted from natural Herbs gives extra bonding properties to synthetic resin ,results better GSS in dry & wet both , testing provided in Mycological test as per IS -1734 ,used for the Plywood Industries.

Advantages:-

1. Ready to use – anywhere, any portion of any type of wood of any type of application-indoor/outdoor.

2. Proper penetration & retention by Wood species.

3. Non-leachable & No toxic to human means Safe to handle-(i.e. No irritation in hands, no fumes in eyes & no smoke in hot press)

4. Toxic to wide range of wood enemies. (Termite, Borer, fungus etc.)

5. Increase the Life of Wood Panels.

6. High degree of permanence.

7. Non-corrosive to Doctor Roller (Neoprene rubber) & metal.

8. Economical.

9. Provide better GSS results in Mycological tests.

10. Best solution for using as GLP in Plywood industry.

Physical Properties: -

1. Appearances:-Deep Brown Viscous Liquid.

Dose Recommended:-1 % of the total resin volume.

Mode of uses:-Take out the recommended dose in specially calibrated wood protector beaker with dispensable mechanical pipe in 1/3 rd part of the charged resin in the Mixture, mixed it properly for 5 minutes ,add the left to be charged resin and mix again for another 5-10 minutes.

Formulation:-

Liquid Synthetic Resin (**Amino/Phenolic**)	:-100 parts
Extender /Filler :-(As per requirement)	:-To get the desired viscosity.
Buffer /Accelerator (As per requirement)	:-To get the desired Ph media.
Wood Protector	:-1 Part

Packaging:-20-Kg Virgin Plastic Jar packaging.

Note:-Since the storage and application of the product is beyond our control we cannot assume any responsibility other than the uniform quality of the product.

Wood Preservation:-

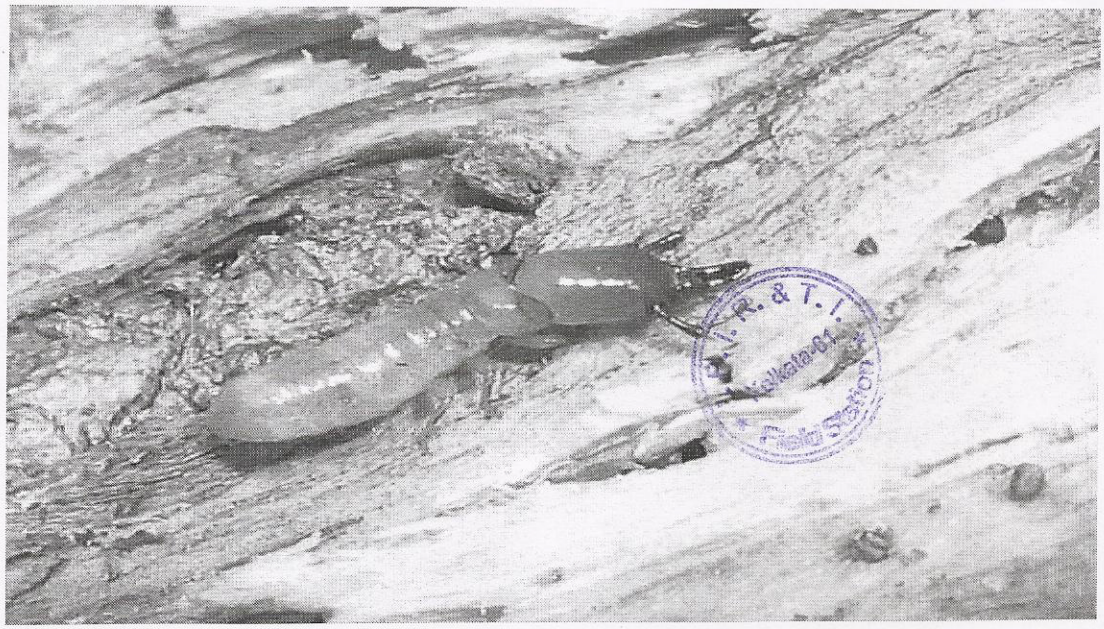
Wood preservation is the process of preserving wood from the wood destroying agents like insects or fungus so that the life span of the wood can be extended. It refers to the treatment of wood with chemicals to impart resistance to degradation and deterioration by living organisms. The proper application of chemical preservatives can protect wood from decay, and stain fungi, insects and marine borers, thus prolonging the service life of wood for many years.

Requirement of Wood Preservation:-

The wood contents celluloses, hemicelluloses, starches and other susceptible materials that attract the fungi and insects to be degraded and eaten. After the preservative treatments, the fungi and insects cannot decompose and feed on these substances, hence the durability of wood is to be increased.

Description of Wood enemies:-

Termites:-Termites never work in open, always in wood or tubes. There are only two types of home in the world those with termites and those that are going to get termites.



Borers:-

It is apparently the most common of the larger false powder-post beetles in India and parts of Southeast Asia. Its habit of boring in packing cases, boxes, plywood, furniture and lumber make it a serious pest. In heavy infestations the wood is often reduced to powder to a depth of 2 to 3

inches. It is a threat to nearly all wood products, and has even been recorded as boring into the lead linings of boxes. In hardwoods, the damage is usually confined to the sapwood, but may extend deeper in soft woods.

Wood Fungi: - A wood decay fungus is a variety of fungus (brown, white, soft rot, staining, and mold and mildew fungi) which has the ability to digest wood, causing it to root.

2.0 Experimental

Laboratory preservative treatment cycle studies have been carried out for efficacy study of wood protector against termite and borer by using wood species such mango, gurjan, and poplar. Glue line treatment of wood preservative chemical is a simple and cost effective method of treating plywood to enhance the service life. These chemicals are diffused to the wood veneer during hot pressing and glue line is a safe location for the preservative.

Following studies has been carried out by taking wood protector in the resin.

i) Modification of wood protector to enhance the bonding strength and toxicity to termite borer.

ii) Pot life of resin with incorporation of wood protector at different concentrations.

iii) Evaluation of strength of plywood in terms of GSS in dry and resistance to microorganism

iv) Toxicity studies and exposure tests.

Five different concentration levels starting from 0.2%, 0.5%, 1.0%, 1.5%, and 2.0% of Wood protector mixing with both phenolic and amino resin has been carried out in this study.

Veneer of size330mm x 330mm x 12 mm at a moisture content of 6 – 8% were used for making plywood using 9 ply construction. Normal glue spreading and hot press parameters are taken for plywood manufacturing as usual with plywood industries.

4.0 Results

The formulations listed have been shown to be efficacious in high pH phenolic adhesives. Wood Protector is stable at high pH and high temperatures. Phenol formaldehyde resins have a pH above 12. Phenol formaldehyde is the most common resin used for plywood. This high pH level degrades most common organic termiticides, Wood Protector is a rare exception. This was confirmed in no degradation was observed 24 hours after mixing Wood Protector with PF resin. The Stability of Wood Protector in Liquid Glues shows positive results .This stability accounts for other types of resins using in the industry named urea-formaldehyde, melamine urea-formaldehyde,.

Studies on pot life of both phenolic and amino resin after addition of wood protector from concentration 0.2% to 2.0 % based on the resin weight shows that no significant adverse effect on mixing of wood protector with both resin.

Resistance to microorganism test shows that there is no delamination of plies at the edges or surface of the plywood which conforms to Indian standards.

Graveyard tests is under progress at IPIRTI,Kolkota and IPIRTI,Bangalore in the wet zone, for a period of six months. The plot size was 8 x 3.5 feet (2.44 x 1.07 m). One foot deptl1 (30 cm)

Mechanical Properties of the 12mm Plywood manufactured by using wood protector

Sl. No.	Conc. Of preservative used (%)	Average Glue Shear Strength						Static Bending			
		Dry State		Wet State		Resistance to Mico-organism		MoR, n/mm2		MoE, N/mm2	
		Load, N	Wood Failure, %	Load, N	Wood Failure, %	Load, N	Wood Failure, %	Along	Across	Along	Across
1	1.0	1390	70	920	60	830	60	40.46	32.67	4895	2948

PRODUCT IDENTIFICATION

1. Product Name: Wood Protector –The glue line wood preservative

Chemical Description: Based on natural product like CSNL,Neem seed extractive,kalmeg extractive with termicides and fungicides.

Appearance: Dark brown Thick Liquid

Solubility: Soluble in inferior alchol and easily mix with Phenolic and amino resin

2. PHYSICAL PROPERTIES

Density (cm3 (25°C): 0,943 – 0,968

Viscosity at 30 degree C, 550(in centipoises)

Moisture, % by weight 1.0

Ph: 6,0 – 6,5

3. HEALTH HAZARD DATA

Health Hazards

• Eyes – Irritant;

• Skin – Irritant;

• Inhalation – Avoid inhalation.

• Ingestion – Avoid ingestion

First Aid

• Eyes – Wash with plenty of water / treat according to medical recommendations;

• Skin –Remove contaminated clothes, and wash the body affected area with plenty of water and ethanol;

• Inhalation –Remove the victim to the fresh air. Give artificial respiration / treat according to the medical recommendations;

5. TRANSPORT AND STORAGE

Store the product in a dry and sheltered place, far from heat and ignition sources