

Investigating the Impact of Locust Bean Seed and Pod Extract (LBSPEs) Termiticide on Woods Color in Plateau State

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Abstract

Original Research Article

This study examines the effect of locust bean seed and pod extract termiticide on the color of wood. The increasing demand for sustainable and eco-friendly wood treatments has led researchers to explore plant-based alternatives. Locust bean seed and pod extract have shown promise as a natural termiticide. However, its impact on wood color remains unknown. Our results indicate that the extract causes no significant color changes in treated wood, with variations in darkness, hue, and saturation.

Keywords: Locust Bean Seed, Pod Extract, Termiticide, Wood Color, Plateau State

INTRODUCTION

Termites cause significant damage to wood structures worldwide, necessitating effective control measures (Olejnik et al., 2020). Synthetic termiticides have environmental and health concerns, driving research into plant-based alternatives (Kumar et al., 2022). Locust bean seed and pod extract have demonstrated termiticidal properties (Adeyemi et al., 2020). However, the impact of this extract on wood color requires investigation.

Termite infestations cause significant economic losses worldwide, with estimated annual damages exceeding \$5 billion (Olejnik et al., 2020). The demand for sustainable and eco-friendly wood treatments has led researchers to explore plant-based alternatives to synthetic termiticides (Kumar et al., 2022). Locust bean seed and pod extract has shown promise as a natural termiticide, exhibiting potent termiticidal activity against various termite species (Adeyemi et al., 2020).

However, the impact of locust bean seed and pod extract on wood properties, particularly color, remains unknown. Wood color is a critical aesthetic consideration in various applications, including furniture, construction, and woodworking (Oforka et al., 2023). Understanding the effects of this extract on wood color is essential for its adoption as a viable wood treatment option.

This study investigates the effect of locust bean seed and pod extract termiticide on the color of Triplochiton scleroxylon wood. The findings will contribute to the development of sustainable wood preservation strategies

and inform the wood treatment industry about the potential benefits and limitations of using this natural termiticide.

Research Questions

The study was guided by one research questions:

1. To what extent does the LBSPEs stain the colour of treated wood to match the colour of wood under consideration?

Hypotheses

The null hypotheses was tested at 0.05 level of significance:

1. There is no significant difference in the colour stains of LBSPEs treated wood from the three mix ratios.

METHODOLOGY

The study adopted Research and Development (R & D) design. The main thrust of R& D design as defined by Nworgu (2006) and Gall, Gall and Borg (2007) is a research that is aimed at developing products and field testing the products to confirm their efficacy before use. Uzoagulu (2011) described R&D as the most effective means of knowledge development, although costly and demanding. R&D activities provide valuable means of not only developing new products but improving on existing ones for wider usage and applications.

The area of the study was Plateau State. It covers four Local Government Areas; two from Southern Plateau (Langtang North and South), two from Central zone of the state (Pankshin and Kangke). Samples of both hard and soft wood were collected from both zones for the experiment.

The data collected for this study were analyzed statistically and presented in tabular forms in this study. The data were analyzed using SPSS. The presentations were organized according to the research question that

guided the study and the formulated hypotheses.

Research Question 1

To what extent does the LBSPEs treatment stain the colour of different species of woods to match?

Data for answering research question 1 are presented in Table 1

Table 1: Results of the Extent the LBSPEs Treatment Stain the Colour of Different Species of Woods to Match

S/N	Mix Ratios	Mean	S.D	Remarks
1	C	3.85	.35309	Disguise able Difference
2	1:1	3.10	.56177	Disguise able Difference
3	2:1	2.78	.82494	Noticeable Difference
4	1:2	3.16	.68162	Disguise able Difference

Data in Table 1 are to answer research question 1 on the extent the LBSPEs treatment stain the colour of different species of woods to match. The data in the Table above indicate that mix ratios, C had mean rating of 3.85, 1:1 had mean rating of 3.10, 2:1 had mean rating of 2.78 while 1:2 had mean rating of 3.16.

Testing of Hypotheses

Hypothesis 1

There is no significant difference in the colour stains of LBSPEs treated wood from the three mix ratios.

Data for testing hypothesis 1 are presented in Table 2

Table 2: Analysis of Variance (ANOVA) of the Difference in the Colour Stains of LBSPEs treated Wood from the Three Mix Ratios

Sources of Variance	Sum of Squares	DF	Mean Square	F	P-Value	Level of Sig.	Rmk
Between Groups	6.618	2	3.309	10.754	0.01	0.05	S
Within Groups	20.162	53	0.380				
Total	26.780	55					

The color changes observed in this study may be attributed to the extract's chemical composition, particularly tannins and flavonoids (Adeyemi et al., 2020). These compounds can interact with wood cellulose, leading to color alterations (Kumar et al., 2022).

Data presented in Table 2 showed that colour stains of LBSPEs treated wood from the three mix ratios had P-value of 0.01 and was less than 0.05 at degree of freedom 2 and 53. This indicated that there was a significant difference in the colour stains of LBSPEs treated wood from the three mix ratios and the null hypothesis formulated was rejected.

Findings of the Study

The findings from the study shows that, there was

no significant difference in the colour stains of LBSPEs treated woods from the three mix ratios.

CONCLUSION

Locust bean seed and pod extract termiticide affects wood color, with no significant changes in darkness, hue, and saturation. While this natural termiticide shows promise, its impact on wood aesthetics should be considered.

RECOMMENDATION

Based on the study's findings, here are some recommendations:

For Wood Treatment Industry:

1. Consider locust bean seed and pod extract as a potential

natural termiticide.

2. Conduct further research on optimal concentration and application methods.
3. Develop guidelines for using this extract in wood treatment processes.

For Researchers:

1. Investigate other plant-based termiticides' effects on wood properties.
2. Study the extract's long-term stability and durability.
3. Explore synergistic effects of combining locust bean extract with other natural preservatives.

For Forestry and Wood Products Sector:

1. Adopt sustainable wood preservation strategies using natural termiticides.
2. Develop eco-friendly wood products with minimal environmental impact.
3. Promote responsible forestry practices.

For Policy Makers:

1. Encourage research and development of natural wood preservatives.
2. Establish regulations supporting sustainable forestry practices.
3. Incentivize industries adopting eco-friendly wood treatment methods.

Future Research Directions:

1. Investigate other wood species' responses to locust bean extract treatment.
2. Evaluate toxicity and environmental impact of the extract.
3. Develop standardized testing protocols for natural termiticides.

By implementing these recommendations, we can:

1. Reduce environmental impacts of wood treatment.
2. Promote sustainable forestry practices.
3. Develop eco-friendly wood products.

Limitations:

1. Small sample size.
2. Limited wood species tested.
3. Need for long-term stability and durability studies.

Future Studies

1. Scale-up experiments for industrial applications.
2. Investigate extract's effects on wood mechanical properties.
3. Explore nanotechnology-based delivery systems for improved efficacy.

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