

Potential of Red Pepper Sauce as a Termiticide

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INTRODUCTION

Environmental concerns has lead to increasing interest in metal-free, organic wood preservative systems. Anecdotal evidence indicates that red pepper sauce can be applied to potentially rancid food to prevent food poisoning. If this is true, then the pepper sauce must have an anti-bacterial effect to some degree. During the pepper sauce manufacturing process, a waste product is created. This waste product is the draining waste of the production process. It is largely the liquid separation of pepper mash which is crushed peppers and 8% salt. However, by the time the pepper sauce production barrels are opened, the concentration of salt is slightly higher due to evaporation. The objective of this study was to determine the potential of pepper sauce waste as a termiticide.

METHODS

The experiment was performed in accordance with AWP A E1-2008 (AWPA 2008) on 11/19/2008. This test was initiated to determine the potential of pepper sauce waste as a wood preservative against Formosan subterranean termite as measured after treatment of southern yellow pine solid wood samples to determine termite mortality, sample weight loss and sample rating (0-10). The no-choice test was used for this study, with 5 replications used for each treatment.

An experiment was conducted testing pepper sauce waste as a wood preservative against the Formosan subterranean termite. Ten percent EtOH mixed with water was used as the carrier. Six treatments were used for this test: water, EtOH, 25% pepper sauce + 10% EtOH/water solution, 50% pepper sauce + 10% EtOH/water solution, 90% pepper sauce + 10% EtOH/water solution, and lastly pure pepper sauce waste. Each treatment contained ten samples, five used for testing and the other five for moisture content determination.

All samples were treated in a modified paint treating cylinder at WDL. The samples were weighted to determine liquid loading, then placed in a fume hood for conditioning. An additional set of samples were treated to determine sample moisture content. These samples were weighed prior to treatment. Once removed for the treating cylinder, the samples were weighed again then place in a force draft oven set at 104°C until they reached oven dry conditions. The samples were weighed to get an accurate weight at oven dry condition. This weight will be used to calculate the actual oven dry weight of the tested samples to determine the final sample weight loss. Each jar was autoclaved and contained 150 g of autoclaved sand

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and 30 ml of distilled water. One sample was placed in each jar on top of an aluminum foil barrier to prevent leaching. Termites were obtained from Brechtel State Park in Algiers, LA, St. Bernard Parish on 11/17/2008. Termites were counted and weighed and an average weight per termite was determined. Average weight per termite was used to weigh out the correct number of individuals that were placed in each jar, based on the weight per individual. Four hundred termites, based on weight, were introduced to each jar on the side opposite the sample. Untreated southern yellow pine samples were used for controls. After 28 days of exposure, the samples were removed and cleaned with distilled water to remove termites and sand. Sample rating was determined by visually rating each sample using the AWP A E1 rating system. Sample weight loss was determined by oven drying each sample, then weighing each sample to get an oven dry weight. Termite mortality was determined by counting the number of live termites present after completion of each test. Means and standard deviations were determined (SPSS 2006). The data obtained were analyzed using analysis of variance and The Least Significant Difference (LSD) mean separation test procedure (Steel and Torrie 1980).

RESULTS

Pure pepper sauce waste resulted in 75% mortality, while the 90% + 10% water/ethanol resulted in 22.5% mortality, followed by 50% pepper sauce + 50% water/ethanol at 11.7%, followed by 25% pepper sauce + 75% water/ethanol at 9.3%, then lastly the ethanol with 7.3% and water with 6.5% mortality. Pure pepper sauce waste treatment had the highest termite mortality of all treatments.

40+% sample weight loss was observed in water and ethanol treatments, followed by 25% pepper sauce treatment with 37.8% weight loss, followed by both 50% and 90% pepper sauce treatments with around 20% weight loss, and lastly the pure pepper sauce waste had 17% sample weight loss. The pure pepper sauce waste treatment had the lowest sample weight loss.

Using visual ratings treatments were ranked as follows: water and ethanol were complete failures, followed by 25%, 50%, 90% and lastly pure pepper sauce waste treatments. The 90% pepper sauce treatment did fair with an average rating of 7. The pure pepper sauce waste treatment had small amounts of attack and had an average rating of 9. The pure pepper sauce waste treatments outperformed all other treatments in this respect having almost no visual termite attack.

CONCLUSIONS

Treatment of southern yellow pine blocks with pure pepper sauce waste gave the best results against Formosan subterranean termites. Further studies are needed to better establish the potential termiticide effect of this experimental preservative system. On-going work is determining the leachability, corrosivity, and anti-fungal properties of the pure red pepper sauce waste product.

REFERENCES CITED

1. American Wood Protection Association (AWPA). 2008. Annual book of standards. Birmingham, AL.
2. SPSS. 2006. SPSS for Windows. 2006. Chicago, IL.
3. Steel, R.G.D. and J.H. Torrie. 1980. Principle and procedures of statistics – A biometrical approach. 2nd edition. McGraw Hill. New York. 633 p.

Table 1. Mean values and statistical values for sample weight loss, termite mortality, and sample rating for red pepper sauce (RPS), ethanol, and water treatments.

| Treatment ID | Mortality (%) | LSD* | Weight Loss (%) | LSD* | Ratings (0-10) | LSD* |
|--------------|---------------|------|-----------------|------|----------------|------|
| water | 6.50 | A | 45.13 | D | 0.00 | A |
| ethanol | 7.35 | A | 42.90 | D | 0.40 | A |
| 25% RPS | 9.30 | AB | 37.75 | C | 3.60 | B |
| 50% RPS | 11.70 | AB | 20.73 | AB | 6.00 | C |
| 90% RPS | 22.55 | B | 21.09 | B | 7.00 | D |
| pure RPS | 74.90 | C | 17.03 | A | 9.00 | E |

* Different capital letters within columns indicated that significant differences were found at $\alpha = .05$. Significant differences were not found among treatments when means shared the same letters within columns.

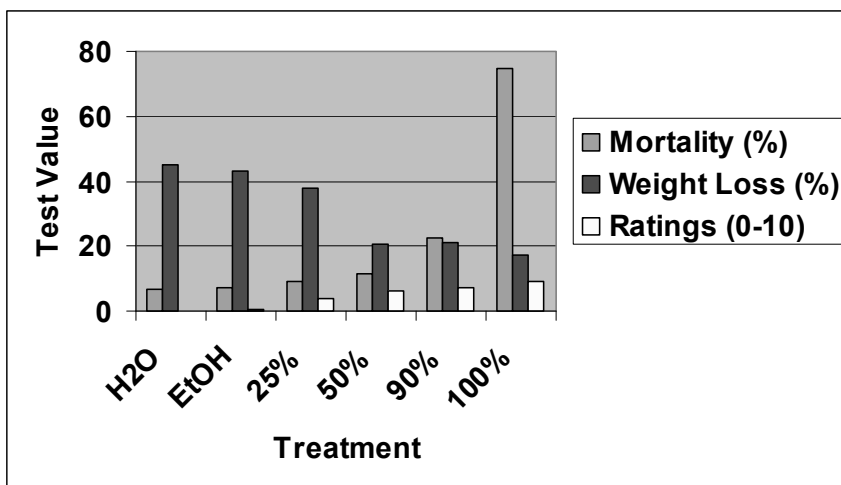


Figure 1. Histogram showing termite mortality, sample weight loss, and visual sample rating obtained using water, ethanol, and red pepper sauce waste treatment concentrations on southern yellow pine blocks for resistance to Formosan subterranean termites.