

PERFORMANCE OF MORINDA CITRIFOLIA PLANT EXTRACT IN PROHIBITING THE GROWTH OF FUNGUS ON TREATED BAMBOO FOR CONSTRUCTION.



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RESEARCH BACKGROUND

Bamboo was accepted as the closest suitable sustainable, renewable material as alternative to timber. Bamboo possess the necessary properties needed for many purposes especially construction. Bamboo has many advantages over timber, however the main weakness is the durability. Bamboo is easily attacked by insects and fungi during storage, transport, processing and final use. They attack due to the presence of starch and other carbohydrates, obtaining their supply of food from the bamboo and degrading it, reducing its durability.

Bamboo has low natural durability against fungi and insects compared with wood [1]. Tropical climate with high temperatures and relative humidity above 70% facilitate mould growth. Exposed bamboo is especially affected by moulds during storage, processing, transport in containers and its final use [2]. The culm tissue does not contain phytotoxic substances as compared to many tree species and its parenchyma cells contains large amount of starch that attracts insects and promotes growth of fungus, thus bamboo is liable to be attacked by fungi and insects, such as beetles and termites [3].

Preservation of bamboo against these biotic agents is important to maintain its durability, strength and enhancement of its service life. Preservation can be done either traditionally or by modern methods using chemicals. Modern methods using specific chemical like Boron, is not readily available locally, need to be imported and is expensive. There is a need to find locally available substance that can be alternative to the imported chemicals for the treatment of bamboo. It was discovered that some village community are using the plant, Morinda Citrifolia (locally known as Mengkudu) to preserve the bamboo for making furniture and handicraft. The objective of this paper is to investigate the durability aspects by comparing the performance of Morinda Citrifolia plant extract against Boron, thus to establish that Morinda Citrifolia extract is an equivalent or better alternative to Boron.

LITERATURE REVIEW

Morinda Citrifolia plant is well known for its nutritional and medicinal values [4]. This plant grows wild and abundance in Malaysia. Previous researcher has proven that Morinda Citrifolia fruit extract can be used to preserve timber against insect infestation [5]. Although it has never been tried for the treatment of bamboo, like other timber treatment chemical, strong possibility too that it will works on bamboo. This method does not involve high costs because Morinda Citrifolia plant is easily available at no cost or very cheap. This whole treatment cost will definitely be cheaper than using imported chemical like Boric acid and Borax.

Bamboo has low natural durability against fungi and insects compared with wood (Liese and Kumar, 2003). Bamboo does not contain phytotoxic substances to prevent insects and fungus. Contains large amount of starch that attracts insects and promotes growth of fungus [6].

Damage of bamboo by fungi is divided into three main types: mildew, stain and rot. Therefore, the fungi contain three main types: mould fungi, stain fungi and rot fungi (Wang et al. 2000).

Treatment needed to extend durability against post-powder beetle and fungus attacks. Criteria for a good bamboo preservative are sufficient toxicity to prevent insects and fungus attack, safe for human and animal, easy to penetrate and remained in the bamboo, does not affect the physical, mechanical and chemical properties of bamboo, not flammable, easy to work with, easy to transport and cheap [7].

Morinda Citrifolia contains bioactive compound which includes alkaloids, flavonoids and terpenoids. This compound can be utilized as natural preservatives [5].

METHODOLOGY & RESULTS

Bamboo test specimens are prepared from matured construction grade bamboo Gigantochloa Scortechinii (Buluh Semantan) and treated with Morinda Citrifolia plant extract from leaves and fruits of different concentration, compared with specimens treated with Boron and untreated bamboo specimen. A total of 8 bamboo specimens are treated the Morinda Citrifolia plant extract and 2 specimens treated with Boron. Concentrations of the Morinda Citrifolia treatment solution are 6%, 8%, 10% and 20% (C1, C2, C3, C4) for the leaves and similar concentrations for the fruits (C5, C6, C7, C8). Concentrations of the Boron treatment solution are 6% and 10% (C9, C10). Another bamboo culm is left untreated as control specimen (C11). The test specimens in the form of bamboo strips 12mm x 12mm, 1mm thick are placed in the fungus 'Pleurotus Ostreatus' (oyster mushroom) growth blocks.



The rate of growth of the fungus are monitored over a period of time. The effectiveness of the preservation can be observed and compared by the growth of the fungus and the weight loss of the bamboo strips.



The results obtained indicates the plant extract is effective in prohibiting the proper growth of fungus and performed better than Boron in prohibiting the growth of fungus. Bamboo treated using Morinda Citrifolia extract so far does not exhibit any attack by fungus. It also does not alter the natural physical appearance of the bamboo

CONCLUSION

Initial research findings indicate that this plant extract is suitable for the preservation of bamboo. Further more test on durability, physical and mechanical properties need to be conducted to qualify this plant extract as preservative for bamboo treatment that can be accepted for the industry.

With lower the cost of bamboo treatment and will benefit the rural bamboo entrepreneurs where this plant and bamboo is abundance also promotes more bamboo usage in construction.

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