PHILIPPINES WOMEN'S UNIVERSITY

Career Development and Continuing Education Center

Santa Cruz Laguna

JACKFRUIT TREE SAP AND EGGSHELL AS AN ACTIVE INGREDIENT FOR ROOF SEALANT

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CHAPTER ONE

THE PROBLEM AND ITS BACKGROUND

1.1 Introduction of the study

In the Philippines, it is well known that the region experiences 20 typhoons on average annually and has an equatorial, humid climate with high temperatures and copious amounts of precipitation (Davis, 2020). Leaks and structural damage are common problems in every house that require upkeep and repairs. In our exploration of sustainable alternatives for enhancing home comfort and cost-effectiveness, we turn our attention to the ingenious use of fruits, with a particular focus on the versatile jackfruit tree. Beyond the commonly enjoyed edible portions, the jackfruit offers a unique opportunity to extract various components for diverse applications within the household.

This research aims to delve into the myriad possibilities presented by the jackfruit tree, investigating how its components can be harnessed to create solutions that not only contribute to human well-being but also offer a sustainable alternative to conventional household items. By incorporating the jackfruit tree's resources into our daily lives, we aspire to provide practical insights that align with ecological principles, ultimately paving the way for a more environmentally conscious and resourceful approach to home living.

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By combining jackfruit tree sap and eggshells, the objective of this research is to create an affordable, environmentally friendly roof sealant that is both sustainable and contributes to the reuse of agricultural waste. An additional dimension to this research is the investigation of eggshell properties as a reinforcing agent, which offers a thorough understanding of the synergistic effects of these natural ingredients in creating a long-lasting and environmentally friendly roofing solution. As we continue our investigation, the advantages and disadvantages of this novel approach will be examined in order to pave the way for a more resilient and sustainable construction sector.

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1.2 Background of the study

The jackfruit, scientifically named (Artocarpus heterophyllus), Known for its enormous, adaptable fruit, this plant is native to South and Southeast Asia. The thick, sticky sap that the tree yields has been traditionally used for a variety of reasons. Because the sap from jackfruit trees is high in natural resins, it could be used as a bio-based sealant. According to research, the sap may be able to build a protective layer on surfaces because of its adhesive qualities The tropical climate of the Philippines and its significance to the country's economy have made Jackfruit cultivation there a thriving industry (Carpo, 2019). While it can be used in the production of roof sealant, it can also be strengthened by adding different materials or minerals that complement the solution, such as calcium carbonate which can be found in eggshells (McCleland,2021). Eggshells are frequently discarded, yet they contain calcium carbonate, a chemical known for its capacity to increase material strength and durability. Incorporating eggshells into roof sealant formulations may provide additional benefits such as increased structural integrity and resistance to environmental pressures. While roof sealants serve the critical function of protecting buildings from external elements, certain formulations may pose potential health risks to individuals. Traditional roof sealants often contain volatile organic compounds (VOCs) and other synthetic chemicals that can release harmful fumes into the indoor air over time. Prolonged exposure to these emissions may lead to respiratory issues, eye irritation, and allergic reactions.

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Additionally, some roof sealants may contain hazardous substances such as formaldehyde and isocyanates, which are known to have adverse health effects, including respiratory and skin irritations. The application process itself may expose workers or homeowners to these harmful substances. Furthermore, improper ventilation during and after the application can exacerbate indoor air quality concerns. As a result, there is a growing concern about the potential negative impact of traditional roof sealants on human health.

Due to the previously mentioned issues, the purpose of this study was to investigate the effectiveness of Jackfruit Tree Sap and Eggshell as alternative, active ingredients for roof sealants in order to create a bio-based roof sealant that will benefit the community, address the current environmental issues caused by roof sealant production, and educate people about the health risks associated with using market synthetic roof sealants. This study also assesses the capabilities, sustainability, and durability of the prepared organic roof sealants.

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1.3 Statement of the problem

The researchers aim to expand the use of jackfruit tree sap and eggshell and to determine the community feedback on their utilization. Additionally, the study seeks to answer the following questions:

1. Investigate the effectiveness of using jackfruit tree sap and eggshell as active ingredients for roof sealant, focusing on:

1.1 Appearance

1.2 Quality

1.3 Texture

2. Explore the impact of this innovative approach in comparison to conventional sealants, relying on:

2.1 Environment

2.2 Samples

2.3 Cost-Effectiveness

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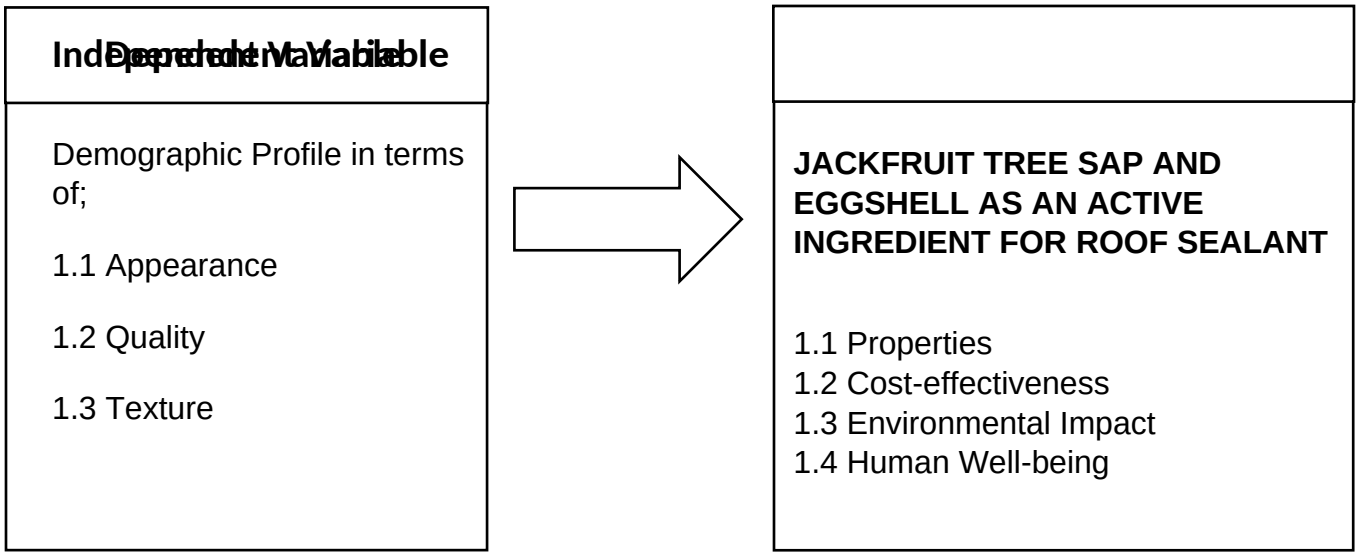
1.4 Conceptual Framework

The Conceptual Framework of the study illustrates the potential of harnessing the capabilities of jackfruit tree sap and eggshells as a roof sealant. The independent variables under consideration evaluate the effectiveness of this innovative combination concerning appearance, quality, and texture. These key characteristics are pivotal in determining the overall efficacy and user experience of the proposed roof sealant. On the other hand, the dependent variables encompass crucial aspects of the study, including the properties of the roof sealant, its cost-effectiveness, the environmental impact of its usage, and its potential implications for human well-being. By exploring these dimensions, the research aims to provide comprehensive insights into the viability and holistic impact of incorporating jackfruit tree sap and eggshells into the realm of sustainable and environmentally conscious roofing solutions.



Frame 1 **Frame 2**

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Figure 1. Research Paradigm

Frame 1 - Consist of Independent Variable which include the effectiveness of Jackfruit Tree sap and eggshells, in terms of Appearance, Quality, and Texture

Frame 2 - Consists of Dependent Variable which include the Jackfruit Tree Sap and eggshells as an active ingredient for roof sealant in terms of:
The Roof sealant Properties, Cost-Effectiveness, Environmental impact, and Human Well-Being

Figure 1 - Consists of two frames, the first frame deals with the effectivity of Jackfruit Tree Sap and Eggshells in terms of Appearance, Quality, and texture. The second frame deals with Jackfruit Tree sap and eggshells as an active ingredient for roof sealant

1.5 Scope and Limitation

This research aims to formulate a roof sealant using jackfruit tree sap and eggshell as an active ingredient. The study will involve the synthesis of the sealant, followed by comprehensive testing to evaluate its adhesive strength, waterproofing capabilities, and durability. The research will include a comparative analysis between the developed sealant and commercially available roof sealants. Various properties such as cost-effectiveness, environmental impact, and performance will be considered for the comparison. The scope also encompasses the exploration of potential applications of the Jackfruit Tree Sap and Eggshell-based sealant, considering different roof materials commonly used in construction.

The research will primarily focus on the performance of the sealant in a specific geographical location and climate. Result may not be directly transferable to areas to areas with significantly different environmental conditions. While efforts

will be made to assess durability, the study may have limitations in providing insights into the long-term effects of the sealant, as extended exposure to environmental factors may take years. The study will primarily focus on the compatibility of Jackfruit Tree Sap and Eggshell with roof materials commonly used in construction. However, it may not cover the entire spectrum of potential roofing materials.

1.5 Significance of the Study

The significance of conducting this study is the benefits of using Jackfruit tree sap and eggshell as active ingredients in roof sealants are manifold. The purpose of this study is to provide light on the practicality of utilizing eggshell and jackfruit tree sap as roof sealant, potentially providing a solution to typical issues with roof sealing. Listed below are the key gainers:

Environmental Sustainability: This study explores the use of eggshell and sap from jackfruit trees as natural materials for roof sealants. The goal of this strategy is to lessen the reliance on artificial and perhaps dangerous chemicals, which can have negative effects on the environment during manufacturing, use, and disposal.

Community/Filipino Households: The Filipino community, particularly households dealing with issues of sustainability and durability in housing, especially in areas that frequently experience heavy rainfall, stands to gain the

most from this study. In order to solve typical problems with roof care and leaks, this research aims to harness the natural qualities of eggshells and jackfruit tree sap to create an affordable and environmentally friendly roof sealant solution.

Health and Safety Considerations: This study reveals that traditional roof sealants could include dangerous substances that endanger both human health and the environment. It might be possible to create a sealant that is safer and healthier for building occupants as well as workers by using natural components like eggshell and jackfruit tree sap.

Student Researchers: Student researchers will learn about the investigative and experimental methods in this project, which will also push them to be more creative and aid in their academic and professional growth.

Future Researcher: Future researchers in the field will find this study to be an invaluable resource as it provides knowledge, ideas, and insight for investigating other applications of eggshells and jackfruit tree sap, thereby creating new research directions and stimulating innovative discoveries.

1.7 Definition of Terms

1. **Jackfruit –** The Jackfruit known as ‘’Artocarpus heterophyllus’’ is a member of the Moraceae family. With a sharp shell and sweet, fibrous flesh inside, it's the largest fruit that grows on a tree.

2. **Artocarpus heterophyllus –** Artocarpus heterophyllus is the scientific name for the jackfruit tree. It is a tropical tree belonging to the Moraceae family and is known for producing the large jackfruit. The tree is evergreen and can reach a

considerable height, providing shade and bearing the jackfruit, which is a significant food source in many regions.

3. Jackfruit Tree Sap – The sap of the jackfruit tree refers to the liquid or resin obtained from the tree's trunk. This sap can be sticky and is sometimes used in traditional medicine or as a natural adhesive in certain cultural practices.

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4. **Eggshell –** eggshell is the outer covering or protective layer of an egg. It is typically hard and brittle, providing a barrier that protects the egg's contents. Composed mainly of calcium carbonate, the eggshell serves to support and protect the developing embryo within the egg.

5. Roof Sealant – Roof sealant is a material used to seal and protect roofs from leaks and water damage. It comes in various forms, such as liquids, sprays, or pastes, and is applied to roof surfaces to create a waterproof barrier. Roof sealants are commonly used in construction and maintenance to prevent water infiltration, prolong the life of the roof, and protect the interior of buildings from water-related issues.