Development of an Innovative Water-Resistance Laminated Food Packing Material

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GM Institute of Technology, Davangere-577006

Department of Mechanical Engineering

Name of the students:

1) Ajith Ramesh Meti (4GM19ME003)
2) Manoj Kumar K B (4GM18ME047)
3) Suman Patil G R (4GM18ME097)

Project Guide: Dr. Srinivasa C V, Mobile: 9448588792, E-mail: srinivasacv@gmit.ac.in

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Introduction/Background:

Nowadays it is difficult to imagine food without packaging. Food packaging protects the foods from physical, chemical and biological contaminations. At the same time, it enhances the life of food and preserves the quality. Number of biopolymers have been used for biodegradable packaging films. Normally they prevent oxidation of food for long period of time with high power to resist moisture, aroma, and transfer of solvents.

The films are first formed and adhered to the surface of the product, while coatings are directly formed on the surface of the food products. Nevertheless, both films and coatings are comprised of rigid matrices and demonstrate certain physiological, biological, and other properties (Figure 1.1)

Figure 1.1: Some features of bio-based food packaging materials

Objectives:

The disposable plates made up of plastics such as polythene, polypropylene, polystyrene, polycarbonate, polyvinyl chloride, etc. pose health risks due to the release of toxic chemicals; bisphenol A, melamine, vinyl chloride, and phthalates. The usage of disposable plastic ware not only depletes fossil fuels but also causes micro plastics pollution.

The present work aims to develop a new to utilization of disposable plates made from naturally available fronds of areca sheet, which are renewable, biodegradable, and enriched with antioxidants and medicinal values in order to support areca nut growing farmers with economic benefits.

Methodology:

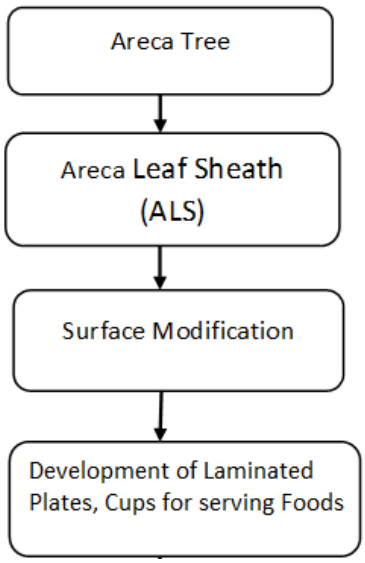


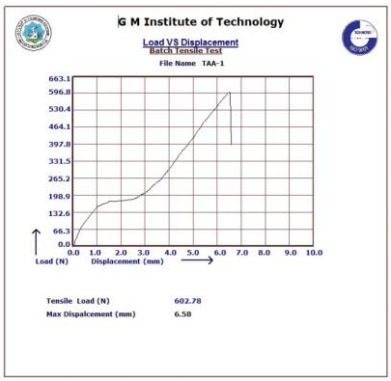
Figure 1.2: Methodology adopted in the present work

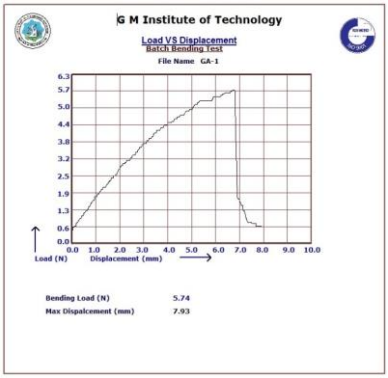
Finally, to make study a comparative between the developed foods serving products with the commercially available made up of plastics such as polythene, polypropylene, polystyrene, polycarbonate, polyvinyl chloride, etc.

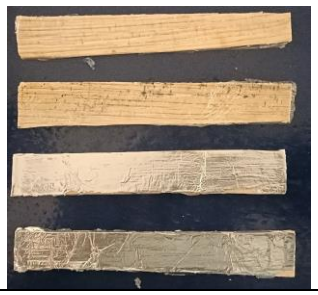
Results and Conclusions:

In the present work, use of laminated areca leaf sheath as food container was studied with different mechanical considerations. Tensile test results indicate that, proposed laminated ALS container is having superior tensile strength properties as compared to other plant based/ animal based protein containers. Average tensile strength for the laminated areca leaf sheath food container sample was found to be 20 MPa. Also, the proposed laminated ALS samples were showing good bending properties when they were tested under UTM with the average bending stress was found to be 22.5 MPa. Similarly, the moisture content test was carried to study the rate of moisture absorption by

the proposed laminated ALS samples. Among two samples (untreated and 4% NaOH treated ALS samples) treated samples were showing minimal moisture absorption as compared to untreated/raw ALS samples.







Conclusions:

The laminated areca leaf sheath containers were proposed to be used in the place of many polymeric containers. And, it is understood from this work is that, the laminated areca leaf sheath container samples have superior tensile and bending stress characteristics as compared to other animal/plant based protein film laminated containers. Also, it is observed that the areca leaf sheath samples are having good potential of water resistance and it is believed that it will protect the food without any moisture absorption risks.

With all these findings it is proposed that, the laminated ALS samples could be used as a food container material by the hotels, food delivery companies and other sectors where the food packaging is done. This will really help in the economic growth of the farmers and also it helps in the recycling of the agro wastes in the rural area by providing the jobs to the people of rural area.

Scope for future study:

The biodegradable leaf plates have vast potential in international market, which should meet in terms of quality and design. To sustain the practice of using leaf plates and discourage plastic plates; necessary regulations should be imposed by the government and monitored through local governing bodies. The present work can be continued for commerciasation by adopting industry standards.

In addition, school children and college students should be educated and motivated to realize the importance. Also, the present work has the potential to increase income from agricultural waste and benefit the farmers and industries economically and reduce our dependence on synthetic-based resources.