

2016 年臺灣國際科學展覽會 優勝作品專輯

作品編號 180010

參展科別 地球與環境科學科

作品名稱 Biodegradable Roof

得獎獎項 二等獎

國 家 Mexico

就讀學校 College of Science and Technology Studies
State of Tabasco Mexico

作者姓名 Elias Ramos Rodriguez
Julio Cesar Mendez Ramos

Summary

It became necessary to implement a project for the use of vegetable waste generated in the process of handling plantain cultivation, harvest and postharvest, since in Mexico at harvest large quantities of vegetable waste is produced, since only the fruit is used wasting the Pseudostem with leaves and spine.

Based on this information, you can take advantage of banana fiber as raw materials in the manufacture of biodegradable sheets and support options that are feasible and possible to make alternative.

This is an inexpensive process, also friendly with the environment, so that thousands of banana plants that bear fruit after they become sterile and are discarded without realizing their Pseudostem.

1. INTRODUCTION

Natural fibers are filaments, strands or threads, whose origin is in nature, its use is as old as man himself and today is an alternative that can replace the use of synthetic materials, usually come from a substance derived oil, in different industries, including textiles. The chemical and physical properties of these fibers can be harnessed in the creation of new materials, producing textiles for the benefit of man. In the case of bananas, recent research shows that the fiber extracted from the bark of the pseudostem of the banana plant, has applications that benefit humans: crafts, paper, floors and walls for houses, roof coatings, panels rooms between others.

This project indicates that the banana plant is a natural resource that is being lost and hence the interest arose to investigate the uses that could give the pseudostem of banana, considering that our state is one of the major producers at national level, and currently for farmers it is considered a waste product without

economic value. In this paper we present a new alternative for use Pseudostem banana producers giving added value to the waste generated bananas.

2. DESCRIPTION OF THE PROBLEM

In Tabasco the banana crop wastes including Fruit of rejection, rod, pintail and Pseudostem that become thousands of tonnes after harvesting, which are not treated appropriately. As a result of decomposition greenhouse gases are released, leachate polluting groundwater occurs, odors which are accompanied by the presence of insects and predators that alter the balance of the surrounding ecosystem are generated.

Of course, the quality of life of people in the environment is negatively affected. With the use of some of these scrap for producing fiber and later use in the development of new products that offer added value to banana production. This project not

only can greatly reduce the visual and environmental pollution in these areas, it can be an important source of employment in the region that can help minimize displacement to other areas of the country.

3. JUSTIFICATION

In Tabasco there are approximately 10422.22 hectares in production banana whose volume of production is 545387.3 Tons. The state contributes 25 % of the country's output.

Based on this information, you can take advantage of the pseudo fiber as raw materials in the manufacture of biodegradable sheets supporting different options and help reduce the generated impacts on forests and that are feasible and possible to make alternative.

4. OBJECTIVE

Assess the feasibility of developing biodegradable sheets with improved properties from the organic waste from the harvest and post-harvest banana crop.

5. HYPOTHESIS

Obtain materials in the manufacture of biodegradable waste sheets using harvest and postharvest banana

6. GENERAL DATA

Bananas are herbaceous plants, monocots growing vigorously.

There are two species of banana , *Musa acuminata* and *Musa balbisiana* , and most banana cultivars are hybrids of both species. Bananas cultivars vary in size and the

fruit plant , the morphology of the plant, fruit quality and resistance to diseases and insects.

The banana is a plant that grows fast and consists of one or more pseudostems (erect structures like tight trunks and formed by concentric layers of leaf sheaths) , an underground rhizome and a fibrous root system . The whole plant is called a strain . The pseudostem is a functional stem supporting parts banana

Leaves and pods

6.1: The banana leaves are formed by a tubular structure called a sheath, a stout petiole and a lamina or sheet.

6.2 Flowers and fruits: The inflorescences emerge from the center of the pseudostem at 10-15 months after planting; at this time, 26 to 32 leaves should have arisen. The flowers are arranged in a spiral along the axis of the inflorescence in groups of 10-20 and covered by bracts (modified leaves) fleshy purple-green. The bracts fall as the flower development progresses. The first flowers that emerge are female. In edible varieties, ovaries grow rapidly without pollination and transformed into groups rutos called 'hands'. The fruits are berries. Although most banana varieties produce fruit without seeds, some are fertile and produce seed. The last flowers to emerge are male. In frying plantains, the male inflorescence and / or the male flowers may be absent or greatly reduced.

6.3 Roots: Numerous (200-500) fibrous roots exit the rhizome. In the fertile , well-drained , deep soil , the roots can extend 5 feet (1.5 m) deep and up to 16 feet (4.9 m) sideways.

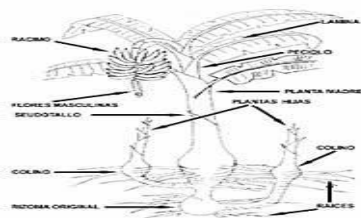


Figure 1. Morphology of the banana plant

7. EFFICIENCY_BANANA_PLANT

As it indicated in the table below pseudostem the highest concentration of cellulose, in addition the fibers are long and hard, this would give us a comparative advantage for the rest of the plant for the extraction of raw materials for production of tablets and biodegradable sheets

Partes de la planta	Peso/Kg	Rendimiento/Ha	Disponibilidad de Fibra seca kg/Ha
Cormo	9,00	11997,00	776,27
Pseudostem	70.42	93869,86	6073.93
Leaves	5,98	7971,34	515,79
Rachis	1,44	1919,52	124,20
Fruits	16,56	22074,48	1428,34
Total Plants	103,40	137832,20	8918,55

Table 1. eficiencia plant

8. CLASSIFICATION OF THE VEGETABLE FIBERS

Vegetable fibers are mainly classified considering the part of the plant which is extracted from it and relate based on the length, shape and texture . Thus it is divided into hard , soft , short, palm trees and currencies.

hard fibers: are those from the leaves found in many species of the Agave family , such as sisal , sisal and sisal . Some books based on their descriptions, allow the inclusion of banana fiber under this classification .

soft fibers: fibers are largely extracted from the bark of plants. It included in this group hemp , jute , linen and ramie .

short fibers: this kind belong fiber extracted from the fruit. His chief deputy is cotton. Other , less known are the kapok and pochote .

Palm fibers: extracted mostly petioles or leaves of such plants .

various fibers: the tamos of cereals, the Amero , the zacatón and beard stick can be included in this group.

9. Methodology

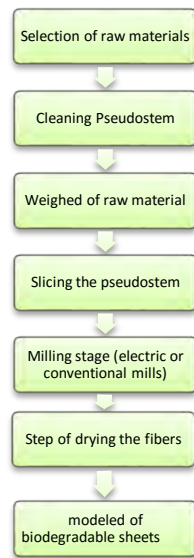


Figure 2 .diagram of flow



Figure 3 Selection of raw material (pseudo stems) plants that have already been harvested



Figure 4. Cleaning of raw materials , removing part of the stem that is in poor condition, in order to obtain a raw material quality



Figure 5. Heavy raw materials



figure 6. The cutting is performed sliced with knives to facilitate milling process



Figure 7.Grinding mills conventional pseudostems



Figure 8. The fibers are subjected to a drying process



Figure 9 Molding step of the fibers to obtain biodegradable films



Figure 12 biodegradable roof



Figure 10 .Drying in the mold



Figure13. biodegradable roof.



Figure 11 .Biodegradable roof

10. ANALYSIS OF RESULTS

With the result of this research, banana growers will diversify its product beyond the mere sale of the fruit. It also opens the possibility of thinking on a large scale industry of biodegradable natural fiber sheets with banana, which would suggest a dip in the local market by leveraging our state has enough raw material for the production of our materials and why not think the same way in the domestic market

The use of vegetable fiber waste is perfectly viable and friendly to the environment because it is sustainable, presents a new alternative to improve

our conditions inside our homes, workplaces, buildings for schools taking advantage of some of the many properties featuring our fiber is heat, allowing it to maintain cool conditions into buildings in times of high temperatures and warm in times of low temperature.

Climate change caused by pollution that exists in our environment makes it necessary

high temperatures recorded to an average of 40 ° to 45 ° C.

We present some results obtained so far as our investigation is not over .

8.1 In our research we have data on average pseudostem has a weight of 85 kg of which 4.335 kg of fiber we get is our raw material.

11. ECONOMIC IMPACT

This project proposes an alternative to generate additional financial resources to the state banana sector , using waste currently have no contribution to the community.

Because crop residues banana consist of lignocellulosic fibers , this can be exploited as raw material for producing paper coatings and this is achieved to provide added value to these residues

Whereas our state ranks second nationally with a production of 545,387.3 tons of bananas and third in acreage with 10,422.28 hectares registered . We have a sufficient supply of raw material for fiber extraction .

12. SOCIAL IMPACT

Banana producers will gain additional income from the sale of agricultural crop residues . The people , settled in the surrounding areas where the waste accumulates

banana , increase their quality of life by eliminating agricultural waste

13. NATURAL FIBERS ARE HEALTHY OPTION

Since most people know that they provide natural ventilation. Is that the reason you feel so comfortable using a cotton shirt on a hot day , and why divers used for weight loss sweating are 100 % synthetic . Wool garments act as insulators against the cold and the heat . Coconut fibers used in mattresses have natural resistance against fungi and mites. Hemp fiber has antibacterial properties , and studies show that the most hygienic textile for hospital linen is flax.

14. NATURAL FIBER IS A SUSTAINABLE OPTION .

We are moving towards a green economy based on energy efficiency , renewable raw materials in polymer products , industrial processes that reduce emissions of carbon dioxide and recycled materials to minimize waste . Natural fibers are a renewable resource par excellence. Growing one tonne of jute fiber requires less than 10% of the energy used in the production of polypropylene . Natural fibers have neutral carbon dioxide emissions. Processing produces residues that can be used in composite materials for building houses or to generate electricity are

created. And at the end of its life cycle , natural fibers are 100 % biodegradable.

15. SAFETY AND HEALTH

Occupational hazards that occur in the world, and particularly in our country , require a government commitment to strengthen safety and health at work and decisive action through political, strategic lines of action and projects a preventive approach to prevail safe and sanitary companies.

The personal protective equipment that workers should use in receiving , unloading, cooking and packaging in the process comprises:

- a. Coat
- b . occupational footwear
- c . Hull against impact
- d . gloves
- e. Mandil

Preventive measures

- Hold with both hands the ends of the container during transport .
- Loading a container at a time .
- Clean the area immediately container retaining any residue or liquid mass .
- Keep work areas clear of obstructions and traffic .
- No run when the products are transported .

- Avoid wearing loose clothing as well as rings , bracelets or watches .

- Remove or remove debris into the hopper only when the movement of the screw mill in detention

- Supplying the contents of the hopper when it is consumed half of the tank.

16. CONCLUSION

Producing fiber plant banana for the preparation of biodegradable plates, it is a project that generates employment, earnings, economic stability, research and development of new products especially for the construction industry with best performance, using the natural resources that exist in the region

Industrial sector represents the opportunity to have a new source of raw material nearest and less costs.

For the environment it represents a decrease of waste produced at impact and an alternative to reduce deforestation

17. REFERENCE

Google: www.siacon.sagarpa.gob.mx

Google:www.lapatria.com

Google: www.agroinformacion.com

Google: www.lafabifamcuba.com

Google: www.redalyc.org

【評語】 180010

Es un proyecto muy interesante . Usando el arbol de banana y las fibras,se puede trans formar a las materiales de los techos . Es muy economico y muy amistoso con el ambiente!