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Mesaolo-On the reuse of corn cobs

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Abstract

This project intends to reuse corncobs from the cultivation of corn with the use of a natural resource produced in large quantities, the resin.

Thus, waste from nature is reused in order to obtain an object used by thousands of people daily, the table tops. As deforestation industrially, with the development of this project, it aims to reduce deforestation to increase environmental sustainability.

Keywords

Corn cores, waste reuse, agricultural residue, resin.

Introduction

The construction of table covers using corn cores is a method of wrapping the resin transformed with crushed cores, elevated at high pressures. This construction aims to reuse material from nature that is wasted, as it has no use, but which will be attributed a high utility from this work.

The greenhouse effect is a natural phenomenon caused by the concentration of gases in the atmosphere, which form a layer that allows the passage of sunlight and the absorption of heat. This process is responsible for keeping the Earth at an appropriate

temperature, ensuring the necessary heat. (Magalhães, 2019) Over the years, there has been an increase in the greenhouse effect, which has been more accentuated over the last century, as emissions of gases into the atmosphere are increasingly suffering considerable increase. This problem can be combated with the policy of the three R`s, which are Recycle, Reuse and Reduce (Sampaio, 2010).

The resin is a viscous liquid expelled through a wound made in a tree bark, this leaves slowly hardening with exposure to air. (Cardoso, 2014) Two types of resins can be found in nature, oleoresins and balsam resins. However, resin can still be synthesized from a polymerization reaction by addition or condensation which consists of a reaction between monomers forming the polymer, which is the resin. Plants that contain resin in their constitution have some important reasons for doing so, even though they are still being debated. However, it is known that the resin is capable of healing wounds made on a plant, killing insects and fungi (Infopedia, 2007).

Corn is a cereal grown in a large part of the world. This has several purposes due to its nutritional qualities, being used for food for humans as well as food for animals. Corn is one of the most nutritious foods is nature therefore, it is an important source of energy. This crop has a versatility of nutritional qualities, however there are several ways to use it in food products, as corn is present, for example, in bread, cereals, biscuits and in some types of beers. (Copacabana runners, 2000) Corn production can have two potentialities: production for silage, which consists of conservation of the culture based on fermentation, and for the production of grain (Anpromis, 2020). In the production of corn to obtain the grain, agricultural residues are presented at the end of their cultivation. One is straw, which has the purpose of serving as fertilizer for the cultivation of other species. The other is the inside of the ear of corn. This component only has two purposes: one of them is for culinary, some plates can contain this part of the corn; and the other, which is more ordinary, is the burning. Although this material can be used in

various recipes, it is generally considered to be an agricultural residue (Pinto, et al., 2012).

However, taking into account the large number of corn plantation areas at national level (Portugal), as well as worldwide, and the problem of burning the core, the possibility of innovative applications for this agricultural residue could result in an affordable and sustainable alternative product, as well as beneficial environmental impact (Cardoso, 2014).

Tarara is an agricultural machine with the objective of cleaning the corn, in other words, it consists of several sieves through which the corn passes, with separation between grains and corn cobs.

Methodology

The materials used in this project were: 2 kg of resin, 4 kg of crushed cores, iron plates, a tin can, a heat source, aluminum foil, 4 struts, a tarara and a wooden board.

Thus, after the mold was made, which consisted of welding 4 iron sides to a base, the “Mesaolo” will be 60 cm (cm) long and 40 cm wide, and its thickness will vary according to the controls present in this project.

In this way, for the realization of this project, the natural resin is liquefied, it is then wrapped with the crushed cores with the aid of an electric centrifuge, after which the mixture is placed in the mold having this aluminum foil to finish a wooden board is placed on top of the mixture and pressed.

For the grinding of the cores, two processes were carried out, one of which consists in obtaining them, being obtained by cleaning the corn with the aid of a tarara, where it distinguishes between corn, remains of cores and avia. On the other hand, a process was

carried out that consists of grinding cores using a drilling machine in which an iron tube was placed around a drill in which with the high rotation force it grinds the cores.

Results

In carrying out this project, two prototypes were made, whose characteristics are shown below.

Table 1: Results obtained

Characteristics		**1st Prototype**	**2nd Prototype**
Dimensions	**Length**	60 cm	60 cm
	Width	40 cm	40 cm
	Height	5 cm	4 cm
Color		Dull brown, original color of the cores	Darker and brighter brown
Texture		Mostly smooth but with some irregularities	Completely smooth and smooth

Compactness	Not very compact and its breakdown possible	Very compact, with no hollow places
Toughness	Some	High
Fungi	There is no fungi	

The 1st Prototype (**Fig. 1**) presented some desired characteristics, but it was not completely as expected, since in the realization of this prototype it suffered very little compression.

Figure 1: 1st Prototype

While the 2nd Prototype (**Fig. 2**) carried out, due to the changes and improvement of the methodology, it was possible that this acquired the fundamental characteristics so that the final result was the one indicated for this project.

Figure 2: 2nd Prototype

Discussion of results

To obtain a final result that was compact and without desegregation of the cores, it was possible to create two different prototypes, in which it was possible to observe a difference between their appearance.

We can observe by comparing the two prototypes that none of them presented the creation of fungi or bad smells, which is an advantage because it is a project that does not decompose easily.

Comparing the appearance of the two prototypes, they are quite different even by their color, as the first has a lighter color than the second, because this one has been exposed to more heat and has a darker color.

Due to the heat provided during the entire prototype execution process, the second in terms of compaction is much better, as it was possible that it was more pressed because when the mixture was placed in the mold it was hot thus helping in the pressing, while in the first it was difficult to press due to the low heat and when the mixture poured into the mold was already cooling, preventing a better pressing. We can report that heat was a variable from the first to the second prototype, thus providing improvements in terms of compaction and aggregation.

Consequently, the height of the two prototypes varied since the second was more compact than the first, so it has a greater height compared to the second prototype, not being the most suitable for this project.

In this way, we can prove that with a heating in all stages of the realization of the project, a better final result is possible, because as the resin has a low melting point it cools very easily and is difficult to mold, so when the mold is hot and it in liquid, it is easier to proceed its molding and consequently to obtain a better final result.With the realization of the two prototypes and obtaining the second with the characteristics closest to the

Figure 3: Final result

intended one it was possible to obtain the final result (**Fig. 3**), this being the top of a table.

Conclusion

The development of this project helped us to understand the quantities of raw materials that would be necessary to use, in order to manufacture a sustainable product, through a process that would not damage the environment and that would reduce the greenhouse effect.

At the end of this project it was possible to verify that it is possible to obtain a very useful object in our daily life from an agricultural residue - corn kernels.

Taking into account the prototypes developed, we can conclude that the second method, which consists of using a heat source throughout the table top manufacturing process, is the most suitable, since the final product has characteristics more close to the desired ones.

Traditional table tops are made from wood, therefore needing to resort to deforestation, thus causing global warming and decreasing biodiversity, among other negative consequences for ecosystems. Due to the fact that the table top developed in the “Mesaolo” project is made from reusable materials, it becomes more sustainable than traditional ones, thus avoiding the worsening of current environmental problems.

Although it was possible to achieve a product similar to the one intended, its final characteristics were not entirely those expected. This is due to the fact that it was not possible to use a more effective pressing method.

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