weave up!

Overwiew of cork context in Portugal followed by cork master designer presentation for *Weave Up!* project, funded by European Union (Creative Europe programme)

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IDEIAS EMERGENTES

Overwiew of Cork in Portugal

Introduction

Cork is the bark of a tree: the cork oak. The particularity of this bark is that it has an external layer made up of suberised cells which form a homogeneous, elastic, impermeable and thermally insulating fabric. When it is harvested, it doesn't harm the tree. This tree is currently the only one producing exploitable quantities of suber, even though this plant tissue is present in all vascular plants and sometimes in remarkable quantities. The cork oak is a carbon sink that is all the more effective because the tree is exploited to produce cork.
We know cork for its use in wine bottle stoppers, flooring or insulation but it can also be use in the textile field like wallets, handbags, purses and shoes. The problem with textile cork is the glue and the base used which are not vegetable or substainable.

Portugal, world's largest cork producer, produces cork mainly in Santarém, Évora, Setúbal, Portalegre and Beja districts, their oak groves providing around 90% of Portuguese cork production. In 2010, cork production was about 201,428 T, of which 100,000 T (49.6%) were produced in Portugal.

Characteristics

Cork is a natural, versatile, and sustainable raw material. It is light and buoyant because more than 50% of its volume is air, weighing only 0.16 grams per cubic centimeter. Is the only solid that when squeezed on one side does not increase in volume on the other side. Furthermore, cork has an elastic memory which allows it to adapt both to variations in temperature and to variations in pressure. This characteristic is due to the gas mixture between each cell, which facilitates its compression to about half its width and the subsequent decompression, returning to the original shape.
It is impermeable to liquids and gases thanks to the suberin and ceroids present in the cell walls. Its resistance to humidity allows it to age without deteriorating, and it is one of the best sealants on the market. For its low conductivity to heat, sound, and vibration that happens because the gaseous elements that compose it are closed in small compartments and isolated from each other, thus being a thermal, acoustic, and anti-vibratic insulator.
Cork also contributes to allergy protection because it does not absorb dust and therefore prevents the appearance of dust mites. It is resistant to friction because its cells are formed by microscopic gaseous cushions, giving it the capacity to absorb shocks. Its slow combustion makes it a natural fire retardant, and it is a natural barrier against fires because it does not cause flames or release toxic gases during combustion.
It is a 100% biodegradable natural product. Its powder can be used as biomass, a neutral energy source in terms of CO2 emissions. It is thought that the physical properties of cork, namely that it is a good thermal insulator, could protect cork oaks from the effects of fires. After a fire, while many of the trees can only rege-

nerate from seeds (for example, the Maritime Pine) or from the sprouting of branches at the base of the trunk (for example, the Holm Oak), in the Cork Oak the branches protected by cork remain viable and new shoots quickly recompose the crown. This rapid reconstitution of the tree's crown seems to be an advantage over other species which, after fire, return to an initial state of development. Cork may have been an evolutionary response of the cork oak in an environment where fire would be an important ecological factor.

Process

The life cycle of cork as a raw material begins with the harvesting of the bark from the cork oak trees. This is called stripping and is carried out during the most active phase of cork growth between mid May or early June until mid or late August.

In the first stripping "desbóia", a cork is obtained with a very irregular structure and hardness that is difficult to work with. It is the so-called virgin cork that will be used in applications other than cork stoppers since it is far from having the quality necessary for this purpose. Nine years later, in the second stripping, a material is obtained with a regular structure, less hard, but still unsuitable for the manufacture of stoppers and which is called secondary cork.

It is only in the third and following strippings that cork with the appropriate properties for the production of quality stoppers is obtained, since it already has a regular structure with a smooth back and belly. This is the so-called reproduction cork. From this time onwards, the cork oak will provide good quality cork every nine years for around a century and a half, producing on average 15 strippings during its whole life.

Historical and national context

During Antiquity, cork was not native only to portugal, has some have geld, but also in extensive areas of Spain (especially in extremadura, but also in Catalonia and Valencia). At that time, cork was used for fishing nets cork floats[1], but also as amphorae stoppers[2], it could have been hand pierced to allow the fermentation process. Some cork remains from early Roman Empire were found in Sardinia, used as containers at this time in a communal granary[3].

In Portugal, before the glaciations the mountains were covered with evergreen forests (laurisilva) and during the last glaciation the country had a forest cover similar to the current taiga. These forests were replaced by mixed forests of evergreen and deciduous trees, transforming the country – north of Tejo – into an immense deciduous oak forest and perennial – south of Tejo -.

Due to the destruction of these forests with the exception of some areas of cork oak and holm oak, the mountains in Portugal became covered with heather, broom, gorse, "torga" and "carqueja" bushes. Starting from the 19th century, the mountains were artificially reforested with maritime pine, giving rise to continuous areas of pine forest.

The cork oak forest "montado" is one of the richest ecosystems in the world. Portugal has the largest area of cork oak forest in the world, corresponding to 34% of the world's area and an area of 800 thousand hectares and 22% of the national forest[4].

The area of cork oak forest has grown by about 3% in the last 10 years, as a result of some reforestation pro-

1 Carmen Alfaro Giner, "Fishing Nets in the Ancient Worl: the Historical and Archeological Evidence", in Tonnes Bekker-Nielsen and Dario Bernal Casasola (ed.), Ancien Nets and Fishing Gear, 2010, Aarhus University Press, p.76

2 Evelien Denecker and Jatelijn Vandorpe, "Sealed amphora stoppers and tradesmen in Greco-Roman Egypt: archeological, papyrological and inscriptional evidence", in BABesch, Vol. 82, 2007, pp. 115-128.

3 Ibid.

4 Teresa Pinto-Correia, N. Ribeiro and Paulo Sa Sousa, "Introducing the montado, the cork and holm oak agroforestry system of Southern Portugal", in Agroforestry System, Vol. 82, No. 2, 2011, pp. 99-104.

grams. More than 130 thousand hectares have been planted in Portugal and Spain, in the last 10 to 15 years, with a density of approximately 120 to 150 cork oaks per hectare[5].
"Montado" can present itself as a dense forest or as an area of pasture or forest interspersed with trees. The average density is approximately 80 trees per hectare, although it can reach 120 trees or more and 5% of the total area can be used for cereal crops such as wheat, barley or oats and 40% for pasture. The cork oak forests form cultural landscapes because they are the result of human action by taking advantage of diverse resources: cork, fruits for animal feed, pastures or agricultural crops that coexist in the same area and give it their wild character.
"Montados" may have emerged in prehistoric times in part due to man's use of fire as they still do today on savannahs. There is evidence that they have continued throughout history, making them part of the cultural heritage of the Western Mediterranean.

The reconstitution of today's cork oak stands occurred from the mid 19th century onwards due to the increased market value of cork and the demand in expanding cities for livestock products.
In Portugal, the cork oak (Quercus Suber L) is distributed in the southwest in permeable soils in areas with humid climate and in places with an Atlantic influence and may occasionally occur throughout the territory. It can live up to 250-300 years and produces cork throughout this period. However, cork harvesting is done in nine year cycles and only begins from the moment the tree reaches a perimeter of 70cm, measured at 130 cm from the ground – corresponding to about 20 to 25 years of age of the tree. Harvesting ends when the tree is 150-200 years old after 12 to 14 harvests.

Cork Industry in Portugal
World cork production exceeds 200 thousand tons per year. Portugal continues to lead world cork production with an average annual production of more than 100,000 tons. 46% of the world's cork production is Portuguese[6].

80% of the Portuguese cork companies are located in Entre Douro e Vouga and the country has 640 enterprises dedicated to cork work (73% of them are destined for the wine industry).
Between 2011 and 2013, the financial autonomy of cork companies has increased of 33% and 81% of these companies resitered a positive net result.
95% of Portuguese cork exports are destined worlwide (more than 130 countries, and mostly european ones)[7].

5 Portugese Cork Association APCOR, Cork – Environmental Importance, 2015, p. 13 [online] https://www.apcor.pt/wp-content/uploads/2015/09/Cork-Environmental-Importance_EN_VF.pdf
6 Portuguese Cork Association APCOR, The Cork Sector: From the Forest to the Consumer, 2020 [online] https://www.apcor.pt/wp-content/uploads/2020/12/APCOR-Extended-Summary-Feb-2020-BX.pdf
7 Portuguese Cork Association, Cork Sector in Numbers, 2019 [online] https://www.apcor.pt/wp-content/uploads/2019/02/CORK-SECTOR-IN-NUMBERS_EN.pdf

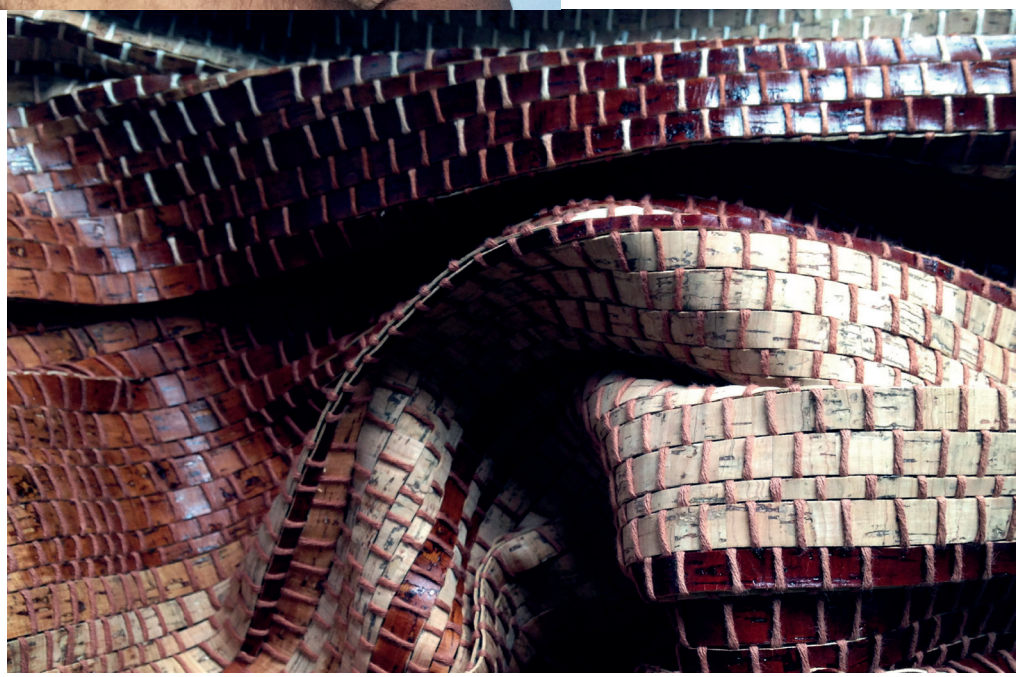
Lucile Drouet - cork master designer

Born in 1893, Lucile Drouet is a French artist, textile designer, sound weaver and founder of Loxiale studio. Inspired by nature and the link with environment, she works as a researcher to explore the presence of vibration, rythm and movement in textiles. Her transversal approche is possible thanks to her art, architecture, textile and musical background. Since 2008, she has collaborated with Patrick Jouin, Christin Lesquer, Le Louvre, Dior, Christian Lacroix, Balenciaga, Chanel, Victor&Rolf and Léa Peckre among others.

For the past five years, cork has become a material of choice for its technical and environmental properties. Her guideline is to find and propose circular textile solutionsn she explores the belonging of the material to a global vibration.

Since 2011, she followed a sustainability and circularity line. Her work with cork embodies these considerations and inspires her to develop a natural vegetable dyeing process, with the help of the chemist Michel Garcia. As vegetable dyeing is done by immersion in water and work is hydrophobic, a process developed in a laboratory was necessary. Following this research, two vegetable dyes : cachou (from the wood of the tree) and indigo (from the leaf of the plant), were developped in order to offer a vegetable, recyclable, long-lasting, non-toxic, rot-proof dye for cachou, and respectful of life object.

Pangolin, traditional indigo coloured cork, 2020 © Lucile Drouet



Corson, woven and coloured cork with cachou, 2019 © Lucile Drouet