

Educational exhibition about flow of renewable energies in traditional maize culture in Galicia

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Renewable energies have been for many centuries the main source of power for all agricultural and industrial processes. Solar energy is still now the only source for plant growing and human feeding. And the need for agricultural production has been one of the major sources of cultural, scientific and architectural development. Many different types of buildings all over the world have been used for different agricultural works and adapted to take advantage of different energy sources.

In the case of Galicia, there has been a strong relationship between agriculture and certain renewable energies like hydraulic, wind and bio-mass, that has been the base of an environmentally friendly culture broken in the last decades by industrial development and contaminant energy sources like carbon an oil.

This article focuses in the particular case of maize cycle in Galicia, the agricultural processes, constructions and renewable energies employed.



Solar energy collector: Maize field and plant

Maize sowing in Galicia is made often in small fields (*eiras*), with a typical density of 2-3 plants per square meter. Sowing time is april-may and harvest is about september-october.

Harvest, storage and drying must be carried out when maize is fully developed. Ox cart is used to transport maize and it is stored in a typical building specially developed to keep grain dry and safe.

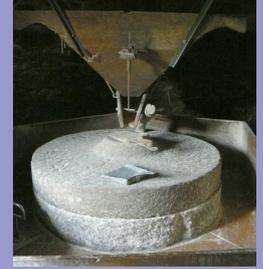


Renewable transportation: the traditional ox cart



An architectural design for drying and storage of maize using renewable energy: the hórreo

The energy stored in dry maize grain is about 3000kcal/kg. Using real data from different sources we have estimated that in Nigrán (Galicia) the efficiency of solar energy conversion in maize cultivation is about 0,4%.



Traditional use of water energy: the Hydraulic flour Mill

In Galicia there are many different types of flour mills according to the source of energy employed (wind, rivers, tide) and type of construction. The most common type is the water mill placed beside a small water stream with a small reservoir and a horizontal water channel (*levada*) that create a difference of level with the main water stream and can be converted into mechanical energy.



Different stages of the milling process

Galician traditional houses had often their own wood oven, that could be inside the main house or as a separated construction. In other cases all the families in a village shared a common oven and used it by turns. Wood ovens are an example of traditional use of bio-mass energy.



Use of bio-mass energy: oven heating and bread baking

CONCLUSIONS

Solar energy is the main source of energy used to produce one kilogram of maize or bread.

The cultivation process uses a high amount of terrain and collects solar energy with a very small performance, but at this time it is the only way of produce food for humans and animals.

In particular, baking is a very demanding process that consumes almost as much energy as that contained in the resulting product, but provides a system of conservation and facilitates human consumption of cereals.

Moreover, agricultural food production has been working well for many centuries, is environmentally friendly and allows sustainable development.

The materials contained in this article will be the starting point to make an educational exhibition about traditional uses of renewable energies in the cycle of maize in Galicia.