

Prediction systems for the annual supply of acorn and flour as raw material for human food products

Author: Inês Conceição, Joana Paulo, Margarida Tomé, Susete Marques, José Guilherme Borges (Forest Research Centre, School of Agriculture, University of Lisbon, Tapada da Ajuda, 1349-017)

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Location: Center and Southern regions, Portugal

Context:

Oak acorns have been part of human diet for thousands of years in many countries around the world. However, oak acorns, like many other wild food products, were gradually displaced over time by increasingly more refined products and have received little attention as resources for improving nutrition and supporting livelihoods. Like many wild forest products, oak acorns are not only an important source of nutrition and sustenance. In fact, they are also growing in relevance for the food industry as “nutraceuticals” and functional foods.

Within the Mediterranean Basin, the *Quercus* spp. is widely distributed across the Iberian Peninsula landscapes, setting up sylvopastoral systems with high ecological and socioeconomic value. In Portugal, the Montado areas are typical landscapes in the Southern and Central areas, with the prevalence of *Quercus suber* and *Quercus rotundifolia*. Yet, acorn production is highly variable between years, geographic locations and even between nearby trees. This variability is a source of uncertainty and a challenge for modelling the production of acorns.

Despite an increase in interest regarding acorns from many oak species, there is a limited number of studies and data regarding acorn yield in Portugal, and those existing are mainly focused on *Quercus rotundifolia* in the Alentejo region. Data collection, research and the development of prediction tools for acorn yield is crucial for developing a sustainable acorn economic row.

Having in mind the context of circular economy, the importance of utilizing by-products is a concern nowadays. Regarding acorns, the usage of cupules and fruit wall (pericarp) for bioactive compounds might be of interest and has never been carried out.

Objective:

This pilot project aims at fulfilling the following main objectives:

1. Collect data that specifies, separately: yield from acorn for human consumption, yield from acorn not suitable for human consumption, acorn cupule yield, proportions of the previous.
2. Review and develop predictive models for estimating acorn and cupule productions of *Quercus suber* and *Quercus rotundifolia* in Portuguese regions.
3. Optimizing drying conditions under controlled environments, namely under distinct temperatures, by the development of drying curves.



Figure 1. Holm oak acorns and cupules (Photo: Inês Bento).

Expected Results:

The correct estimation of acorn and sub products production, both at tree and stand level, is important for different stakeholders along the potential value chain, since anticipating the production of raw material will allow for better planning of its destination.

By the activities carried out by this pilot project we expect to:

- Increase knowledge regarding the main drivers for acorn production.
- Increase data collection focusing on acorn and cupule production in cork oak and holm oak species.
- Carry out the validation of existing models that are compatible with the oak species and edaphoclimatic conditions of the studied areas.
- Providing new tools that forest managers and forestry services can apply under the development of forest management tools and economic plans that integrate acorn production.
- Study and develop acorn drying curves under distinct drying temperatures.

This pilot project will collaborate with the AcornDew project (MTS/SAS/0099/2020), which presents the common goal of developing the acorn economic row, but focuses on the particular case of *Quercus pyrenaica*, present in northern regions of the Iberian Peninsula.



Figure 2. Collecting acorns from the ground in the Montado, Alentejo (Photo: Inês Bento).



Figure 3. Acorn samples from cork oak tree (*Quercus suber*) and holm oak tree (*Quercus rotundifolia*) (Photos: Inês Conceição).