

OAK OPEN FORESTS ("DEHESA " OR "MONTADO ")
OF *QUERCUS ROTUNDIFOLIA* LAM.
AND *QUERCUS SUBER* L.
IN THE IBERIAN PENINSULA AND THEIR
PRODUCTS

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Introduction

"Dehesa " ("Montado " in Portuguese) is the Spanish word used to name the open forests and woodlands of *Quercus* species (mostly *Quercus rotundifolia* Lam. and *Quercus suber* L.) mixed with pastures, forming a savannah-like landscape, that occur in the south-western Iberian Peninsula. They are manmade ecosystems with high levels of sustainability and stability in terms of ecological products. They are good grazing lands on poor acid soils with scattered trees. Pastures are usually divided into enclosed grazing plots, "defended" ("deffesa" = latin word for defence) by stone walls or wire fences to permit the management of livestock (SAN MIGUEL, 1994).

The "Dehesa " lands have changeable Mediterranean climate and form the largest open forest in Western Europe (around 5,000,000 ha) (GONÇALVEZ, 2000). Lands where the "Dehesa " mainly occur are areas of low population



Typical dehesa scene with livestock grazing under oaks.

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density and are among the poorest areas in Europe (Objective One EU Regions below 75 per cent of the average performance, as measured by Gross Domestic Product (GDP) per head of population), and the income that comes from the "Dehesa" represents more than 50 % GDP (CAMPOS & MUSLERA, 1999) for these regions (mainly Andalucia and Extremadura in Spain, and Alentejo in Portugal).

There are two clearly different layers of vegetation in the "Dehesa" — trees and grass.

Grassland has a high turnover rate since annual grasses are alive only during autumn-winter-spring, and survive as seeds during the hot and dry summers. The trees are generally widely spaced with a medium density of 40- 60 trees/ per ha (up to 100 trees/ per ha in pure cork oak forests). They can live for hundreds of years, but today natural replacement is often infrequent. The tree canopy is mainly formed by *Q. rotundifolia* Lam. and *Q. suber* L. (the latter is more abundant in places of oceanic influence), with the occasional presence of *Q. pyrenaica* Willd. (in mountainous areas), *Q. lusitanica* Lam. and *Q. coccifera* L. (as shrubs), and rarely, *Q. faginea* Lam.

In some areas, mainly inside Spain, you can find woodland with only *Q. rotundifolia*, but as you approach the Atlantic Ocean and the soils become more sandy, you will first find areas of mixed forests of *Q. suber* and *Q. rotundifolia*, and then, mainly in Portugal, areas with pure forests of cork oaks appear, in which the cork is so valuable that no grazing is allowed in order to prevent livestock from damaging the trees.

Livestock is both one of the main products of "Dehesa" and the tool for stabilising pastureland and controlling the invasion of shrubs (*Cistaceae*, *Ericaceae*, *Leguminosae*, etc.). However, grazing intensity is critical. The rotation, season, and duration of grazing depends of the animal's requirements for food and water and the particular structure of the ranch.

Products derived from oak open forests

("DEHESA" OR "MONTADO") in the Iberian Peninsula

Since ancient times trees helped human societies satisfy their feeding and clothing needs. For hundreds of years inhabitants of these lands have been selecting the best trees; the ones with sweetest acorns, good morphological structure, and those that are situated in the best locations. Early on, people understood some of the main advantages of leaving oak trees in these pasturelands: acorns could be used as food both by men and livestock, and cork could be used in many useful ways. These early human societies, consisting mainly by shepherds, found thousands of years ago that by not felling the special oak trees of these regions, you could obtain a wide variety of products.

Indirect products

This productive, multi-purpose, manmade ecosystem, close to natural forest, has a very high biodiversity (at least 8 plants & 139 bird species are currently threatened (GONÇALVES, 2000)). "Dehesas" have important ecological (as a place for carbon sequestration forming the largest open forest in Western Europe) and social values, (as a place for leisure in industrialised Europe), but are difficult to quantify economically.

"Dehesa" conserves landscapes of high aesthetic value, low forest fire risk,

and well-regulated hydrological cycle, since the trees protect the soils against erosion in areas with changeable Mediterranean climate. The "Dehesa" is also the repository of cultural, historical and ethnographical values, since it is the place where ancient, indigenous, local shepherds and cork producers lived and worked.

Direct Products

"Dehesa" provides products of great singularity, high quality, and high economic value that are increasing day by day. These products are all produced in a natural, traceable way that is highly valued by today's consumers. Also there are less economic risks for producers and landowners because a large variety of natural products can be obtained in a changeable market. In this descriptive article we will only give a quick look at all the products the "Dehesa" and "Montado" supply, concentrating a bit more on the two most important economic products which are Iberian black pigs and cork.

Acorns

Acorn production of *Q. rotundifolia* is very variable from one year to another and depends of tree distribution, but averages 500kg-ha/year (SAN MIGUEL, 1994). Acorns today are used mainly for fattening Iberian black pigs in the fall, and other animals such as sheep, goats, deer, will complete their feeding requirements with acorns. This is because acorns of *Q. rotundifolia* are big, sweet, and tasty and contain lots of carbohydrates — around 70% dry weight that are easily transformed into fats when eaten by Iberian black pigs (VAZQUEZ, 1998).

In the past *Q. rotundifolia* acorns were eaten directly by men or were dried and crushed into acorn flour. Nowadays they are mainly used for making traditional products such as liquors, acorn chocolates, and acorn cakes. Acorns of *Q. suber* are not as good for animal feeding, and will be eaten by livestock only when *Q. rotundifolia* acorns are not available or are very scarce. Animals that change from eating *Q. rotundifolia* acorns to *Q. suber* acorns will lose weight.



Acorn liquors

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Iberian black pigs

During the time of acorns, known locally in Spain as "montanera" time (Oct.-Feb.), you will find pigs being fattened in a complete natural way all through the "Dehesa" at the rate of 0.5-1 animals/ha. Pigs will double their

weight in only a few months by eating mostly acorns (*Q. rotundifolia*) and grasses (proteins) and mushrooms. They increase in size from around 60-80 kg at the start of fattening time (when they are a year old) to around 120-160 kg three to four months later. They are then slaughtered, with a



Iberian black pigs

photo © E. Balbuena

production of nearly 1,000,000 animals/year (APARICIO & VARGUS, 2000), and their meat has a special delicious flavour. This is why pork and other products from the Iberian black pigs such as "acorn cured ham" (~500?), and special dried up sausages such as "chorizos" (~30?) and "lomos" (~100?), are very expensive. These natural, high-quality products, are highly valued by consumers around the world.



Products of the Dehesa

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Cattle

Cattle are bred and reared in the cooler and moister areas of the "Dehesa" since the animals have great need for water and must be fed supplements during summer. Indigenous breeds such as "retinta", "morucha", "avileña" and "brave Spanish bulls" will graze all year long at the rate of 0.25 animals per hectare, and are bred mainly for beef production (nearly 1,400,000 breeding females in Spanish areas of "Dehesa" (ESCRIBANO & PULIDO, 1998) . Today cattle numbers are increasing rapidly and they are more abundant than in the past.

Sheep, goats and horses

Sheep are grazed with goats in big flocks that require a shepherd and are consequently less profitable because of this added cost. Sheep were the main livestock used in "Dehesa" pastures in the past. Sheep graze all year long (nearly 200,000 sheep were slaughtered in Extremadura alone during 2001). They are stocked at the rate of 1-3 animals/ha, mainly the "merina" breed, but sometimes are also cross-bred to improve production. They are bred for lamb meat and milk, and for a very high quality cheese.

Goats were more abundant in the past and are stocked at the rate of 1-3 animals/ha and produce meat and milk for cheese (nearly 20,000 animals were slaughtered in Extremadura alone during 2001). Horses are only used for recreation or for managing the Spanish brave bulls, since they are very expensive to maintain.

Products from agriculture

Nowadays "Dehesa" lands are only cultivated occasionally to control shrubs and the increased yield is used as supplementary food by livestock or game species during periods of scarce food.

Hunting

"Dehesa" lands are also the feeding zones of many wild animals, such as deer, wild boars, hares, etc. , some of which have high economic value because they are highly-sought-after game species.

Mushrooms

Traditionally only small amounts of mushrooms were collected but today they have become very expensive and are starting to be harvested in an organised way.

Honey

The scarce production of honey is only partly commercialised, but it has a very high quality; it was traditionally used for domestic use.

Firewood and Charcoal

Q. rotundifolia produces a very dense firewood which is very good for home heating and for good quality charcoal for barbecues. Firewood is a by-product of the pruning of oaks to enhance acorn production; pruning for obtaining only firewood is strictly forbidden.



Cork harvesting

photo © E. Balbuena

Browsing of branches

Thin branches and leaves of oaks will be directly eaten by animals from the trees, or the animals will eat leftovers from pruning during dry winters or hot summers when other food is scarce.

Cork

Cork nowadays has acquired a high commercial value because of the continuously increasing demand for cork products including stoppers. The stripping of cork in an industrial way, however, didn't start until the end of the 18th century. The principal cork producing countries are: Portugal (50.5%), Spain (22.7%), Algeria (10.7%), Morocco (5.3%), Italy (4.2%), France (3.7%)

and Tunisia (2.7%) (IPROCOR et al., 1998), and more than 70% of the world's cork production comes from the "Dehesa" (GONÇALVEZ, 2000). New cork oak forests are being planted to insure the future production of cork in areas of "Dehesa".

Today there are strict laws that control the process of cork stripping. The stripping of the tree takes place during summer (June to mid August), because the sap is running more freely through the tree. The first stripping takes place when the tree is about 25-40 years old (70 to 90 cm diameter) and cork from this first stripping is used principally for decorative cork and grain cork after being grinded, as it is useless for stoppers.

With each successive stripping the quality of cork improves, and normally it is not until the third stripping that cork can be used for stoppers. The trees can be stripped again after at least nine years, and up to fourteen years, as the bark is then thick enough for industrial use. Trees can be stripped 12-14 times (until they are 150 years old), without causing the dying-back of the tree.

Two men work at the same tree using special traditional axes and there are more than 10,000 professional cork-strippers in Spain and Portugal (GONÇALVEZ, 2000). They always try to cut up the bark using the same cutting pattern from the previous stripping and they will produce pieces 75-125 cm x 50-

70 cm for easier transport to factories. More than 30,000 people work in Spain and Portugal at cork processing factories and producing companies (GONÇALVEZ, 2000).

The basic process at the factory is as follows (IPROCOR et al., 2000):

CORK TRANSPORTED BY LORRIES TO THE FACTORY;

RAW CORK STORED;

CORK BOILED AND THEN STORED AND DRIED;

CORK CUT INTO REGULAR PIECES;

PIECES SORTED AND PRESSED;

PIECES CLASSIFIED INTO BUNDLES;

DIFFERENT PRODUCTS MADE FROM DIFFERENT GRADES;

- WINE AND CHAMPAGNE CORKS (70% of production by value);
- GRINDING LEFTOVERS FROM MAKING STOPPERS;
- OTHER DIFFERENT PRODUCTS (30% of production by value) - for variable purposes such as products for building industry, car industry, shoes, and many others.

Conclusions

In conclusion, we can only subscribe to the opinion that many ecologists and scientists hold and share nowadays; That is, that the “*Dehesa*” and “*Montado*” ecosystems are very good candidates for listing as a red book of threatened ecologically sustainable landscapes with high biodiversity (RADU & COANDA, 2002).



The Dehesa in Winter

photo © E. Balbuena

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