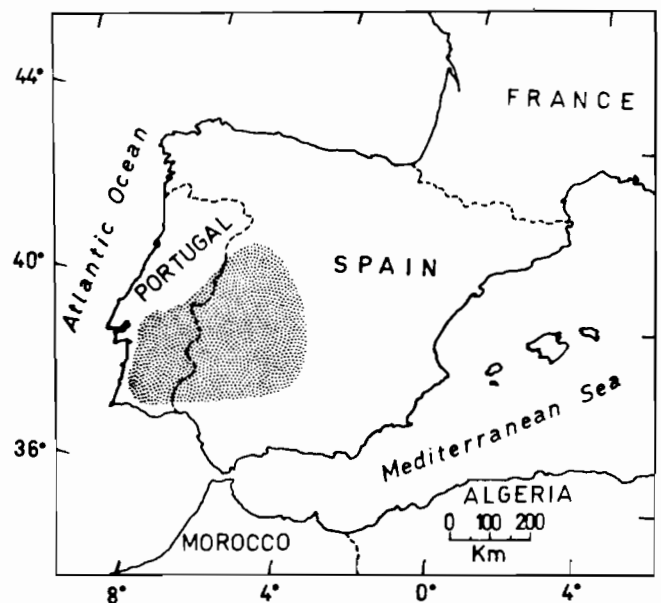


## Agro-Sylvo-Pastoral Systems in the Iberian Peninsula: *Dehesas and Montados*

Teodoro Marañón

The Iberian Peninsula is located in the west of the Mediterranean Basin, receiving the influence of the Atlantic Ocean with a mild mediterranean climate characterized by cold, wet winters and warm, dry summers. Long-time eroded Paleozoic rocks (schists, granites, and quartzites) are predominant in the western half of the Peninsula, offering a landscape of plains and rolling hills, where soils are shallow, acidic, and nutrient deficient. The physical constraints of the shallow soils and the seasonal droughts make most of these lands unsuitable for intensive farming. Instead a peculiar agro-sylvo-pastoral system, called locally *dehesa* in Spain and *montado* in Portugal, has been historically developed. This system, composed of cleared oak woodlands with an annual grassland understory, covers more than 5,500,000 hectares (Campos 1984, Ruiz 1986).

Oak trees (*Quercus rotundifolia* and *Q. suber*) are pruned periodically to increase the production of acorns and cork, while providing fuelwood, charcoal, and browse. An important rural economy is based on the fattening of Iberian pigs with sweet acorns (600–700 kg/ha) (Parsons 1962). The cork oak (*Q. suber*) bark is stripped off every 7 to 9 years. This



Area of dehesas and montados in the Iberian Peninsula.



Shepherd leading a flock of Merino sheep in front of an old holm oak tree.

region supplies almost 3/4 of the world's commercial cork production. Besides producing food, energy, and cork, oak trees modify the micro-environment for the herbaceous understory and serve as shelter for livestock.

Annual grasses and legumes are abundant in a highly diverse grassland (130 species/0.1 ha, Marañón 1985). The annual herb production (900–2300 kg/ha) is concentrated in April–May, providing abundant spring forage. However, supplements (hay, alfalfa, cereals) are needed in summer and autumn. Under the oak trees the drought stress is less severe and the soil has a higher organic matter content favouring the perennial grasses, orchardgrass (*Dactylis glomerata*) and ryegrass (*Lolium perenne*) (Escudero et al. 1985, Marañón 1986).

Native *Retinto* cattle (50%), *Merino* sheep (42%), goats (6%) and Iberian pigs (2%) graze freely in *dehesa* (Campos 1984). The traditional management of open range livestock in this region migrated to America, where it influenced the early cowboy or "vaqueros" culture (Young & McKell 1976). Game animals (deer, wild boar, hare, rabbit, wood pigeon, red partridge) are also consumers of the *dehesa* primary production. The combination of different types of domestic and game animals would optimize the resource exploitation (Ruiz 1986).

On moderately fertile soils, dry farming of cereals (wheat, barley, oat, triticale) that produce 900–1,200 kg/ha is practiced at 4–6-year intervals (Campos 1984). This itinerant plowing also allows the control of undesirable shrubs.

This agro-ecosystem maintains a high biological diversity. It is also an important reserve of plant genetic resources

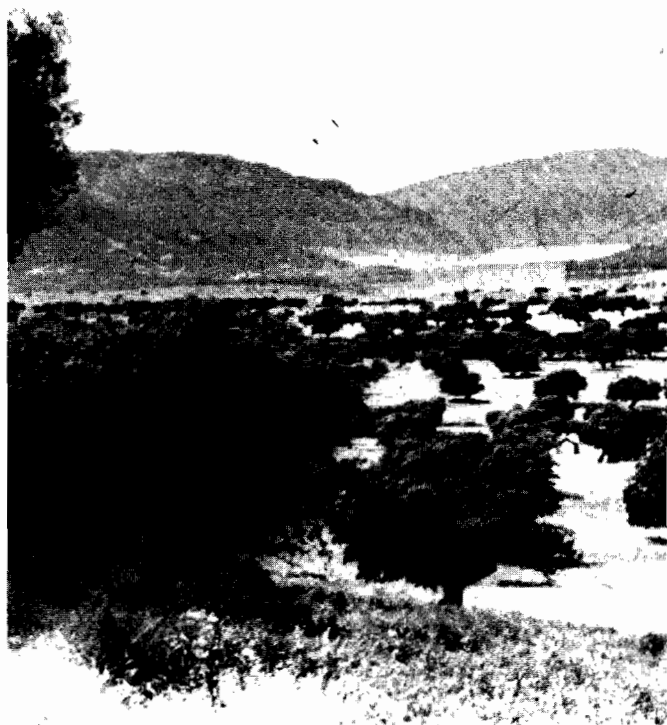
tolerant to seasonal drought, poor soils and heavy grazing. Many of these plant species have been successfully dispersed (accidentally or intentionally) to mediterranean and semi-arid areas in North and South America and Australia. The *dehesa* is one of the last breeding habitats of rare and endangered birds like the imperial eagle, black vulture or black stork, and winter habitat for European cranes.

### Crisis in the Traditional System

This multi-purpose system fits exceptionally well to the semiarid landscape and contrasts with the stereotyped deforested Mediterranean land. However, this fragile man-environment equilibrium is nowadays in crisis. It has been affected by the socio-economic changes, by the African swine fever (that in the 60s caused the loss of 85% of the swine population) and by the world reduction in the price of wool (Campos 1984, Ruiz 1986). After the emigration of the rural area population, many abandoned *dehesas* became less productive, fire hazard shrublands.

In some cases, oak trees were cut down transforming *dehesas* into cereal cropland areas with intensive, subsidized farming. After a few years the fragility of soils and high priced fertilizers and fossil fuel made farming unprofitable. Left were eroded soils, sparse grasslands, with slow recovery and the destruction of the equilibrium of forest-grassland-livestock-soils built up over centuries. In other cases, extensive tracts of *dehesas* were bulldozed and planted with eucalyptus to produce low quality wood and pulp.

However, many *dehesa* managers are still trying to keep the traditional system profitable, through improvement of



General view of a dehesa in the Extremadura region.

pastures (Australian cultivars of *Trifolium subterraneum* have been widely planted), fertilizing, fencing, crossbreeding native livestock with production-selected breeds, and better animal husbandry methods. A regional legislation supports these attempts at "combining the conservation of the *dehesa* ecosystem with its rational exploitation and transformation" (Comunidad Autónoma de Extremadura 1986).

In January 1986, Spain and Portugal became members of the European Economic Community and new expectations and fears are felt by *dehesa* managers about meat prices, the "fuel" that keeps this agro-ecosystem working.

### The 1987 Man and Biosphere Seminar

Prompted by this critical situation, over 100 experts (range ecologists, foresters, and economists) mainly from Spain and Portugal, with participants from other western Mediterranean countries (France, Italy, Morocco, Algeria, and Tunisia), attended in April 1987 the "Seminar on the *dehesas* and other similar agro-sylvo-pastoral systems" under the auspices of the UNESCO-Man and Biosphere program. The conclusions of the Seminar were<sup>1</sup>:

"— The *dehesas* and similar agro-sylvo-pastoral systems have historically proved, over extended land surfaces, to be a model for the management of renewable natural resources, flexible and adapted to the Mediterranean climate in unfavourable environments".

<sup>1</sup>Translated from the original in Spanish.



Iberian pigs feeding on acorns of cork oak during the autumn.

"— These land use systems are still valid and productive over relatively large areas in the Iberian Peninsula, offering possibilities for their extension and adaptation to other regions".

"— The ecological relevance of these systems is remarkable, specially for the maintenance of a high biological diversity, the stability and the conservation of the natural and cultural heritage".

"— The lasting benefits obtained by mankind from this land use are nowadays threatened by the socio-economic changes and by the use of production techniques, without adequate evaluation of their compatibility with the maintenance of the system".

"— These threats are sharpened in the Iberian Peninsula because of the presumable effects of the Agrarian Policy in the European Economic Community".

"The Seminar is aware of the existence of a wide body of scientific information on these systems<sup>2</sup>, and proposes the continuation of basic research on the functioning (ecological, technical and socio-economical) of the Mediterranean agro-sylvo-pastoral systems, as well as the development of new methodologies for the planning, management and restoration of these systems".

"Considering the forementioned reasons, the Seminar makes the following propositions:"

<sup>2</sup>A bibliographical list of 997 references written by Spanish authors and dealing with the *dehesas* (ecology, economy, agronomy, law and history) was provided by the co-organizer of the Seminar (Servicio del Medio Natural, Comunidad de Madrid, 28020 Madrid, Spain).

1. "The planning and achievement of national pilot projects, capable of allowing the building of a network."
2. "The programs included in these projects should contribute to the improvement of knowledge on the functioning and rational use of the *dehesas* and similar agro-sylvo-pastoral systems, serving as a baseline for the activities of training, demonstration and information, and acting as the guideline to insure the sustainable development of the rural space considered, warranting the long-term preservation of the environment."
3. "The creation of a Panel that will elaborate an International Cooperation Project for the specification and achievement of the proposed Program."

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