



# Managing shrub encroachment in cork oak montado

Implications for tree regeneration, tree and cork growth

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## Why manage shrub encroachment in montado?

The impact of the shrub layers that naturally occupy the montado ecosystem can often be positive. Benefits include:

- natural tree regeneration
- protection from excessive light exposure and animal predation
- soil protection
- increased carbon sequestration
- increased fodder diversity
- increased biodiversity

However, there can also be negative impacts. These include :

- tree-shrub-pasture competition for natural resources (water, nutrients and light)
- increased fire risk

The balance between positive and negative impacts varies between farms and even within a single farm. It depends on factors such as:

- species composition and age
- tree age and vitality
- climate conditions
- soil water holding capacity
- grazing animals



Natural tree regeneration protection in an oak montado stand with low tree cover. Ref: G.Moreno

## How to manage shrub encroachment?

A dynamic and holistic management of shrub encroachment in cork oak silvopastoral systems is essential to optimise the positive effects of shrubs, and reduce their negative impacts in the ecosystem. Effective shrub management involves making informed decisions regarding:

- frequency of shrub removal
- mechanical equipment used
- pasture management

Shrub management operations should consider:

- Climate conditions: dry years increase tree/shrub competition for water, therefore encroachment should be reduced
- Shrub distribution, composition and height: high percentage of *Cistus ladanifer* occurrence in extreme dry years is associated with an increase of tree mortality rates
- Ploughing management: a minimum of 5 years between soil ploughing operations should be considered
- Animal grazing: grazing can be an effective alternative for mechanical shrub control (recommended limit value of 0.4 Livestock Units/ha)
- Protection against soil erosion and tree root system damage: no tillage or minimum tillage, or an overall use of mechanical equipment that does not require a deep mobilization of the soil is recommended, especially in areas characterized by shallow soils and high slopes
- Natural tree regeneration: promote the marking and protection of young trees (natural regeneration)
- fire risk assessment: contact between shrubs and tree crowns should be avoided



Improved pasture in a cork oak stand. Ref: Joana Amaral Paulo



## Advantages

Effective shrub management is a dynamic process. It is important to take a holistic approach and consider temporal, spatial, economic and social dimensions. Effective management can lead to:

- reduction of management costs
- greater operational effectiveness and efficiency
- an increase in the frequency of viable young trees through natural regeneration
- increase in superficial water availability particularly during the spring
- preservation of tree root systems
- reduction of fire risk



Cork oak stand characterized by a multispecies shrub layer. Ref: Paulo Firmino

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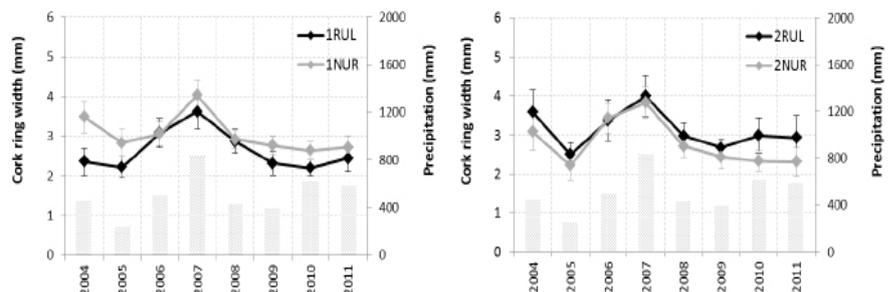
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The following two management systems were compared:

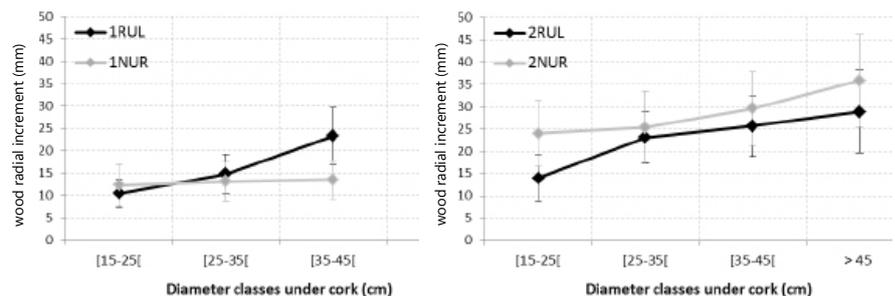
- mechanical shrub removal at 3–4 year intervals followed by lupin pasture creation. The two blocks of this treatment were named "1RUL" and "2RUL".
- mechanical shrub removal at 10 year intervals (restricted to the year prior to debarking). The two blocks of this treatment were named "1NUR" and "2NUR".

### Results show:

- For an annual response period (short term): cork growth is related to total precipitation, irrespective of the presence or absence of shrub encroachment.



Mean annual cork ring measured in a cork samples, in relation to annual precipitation (1 October to 30 September). Vertical bars indicate standard deviation value. Block 1 on the left and block 2 on the right.



Wood diameter increment (mm), 2003–2012, by diameter at breast height class (under cork) for each treatment. Block 1 on the left and block 2 on the right.

**RUL** - treatment consisting on understory removal and lupine pasture installation

**NUR** - treatment consisting in spontaneous understory vegetation maintenance for the complete cork growth rotation period.

- For an annual response period (short term): no significant differences were found for cork annual growth between the two management alternatives.
- For a response period of 9 years (long term): no significant differences were found between the two management alternatives for cork thickness and tree diameter growth.

## Further information

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