

Influence of tree and shrub presence on pasture quality in dehesa system

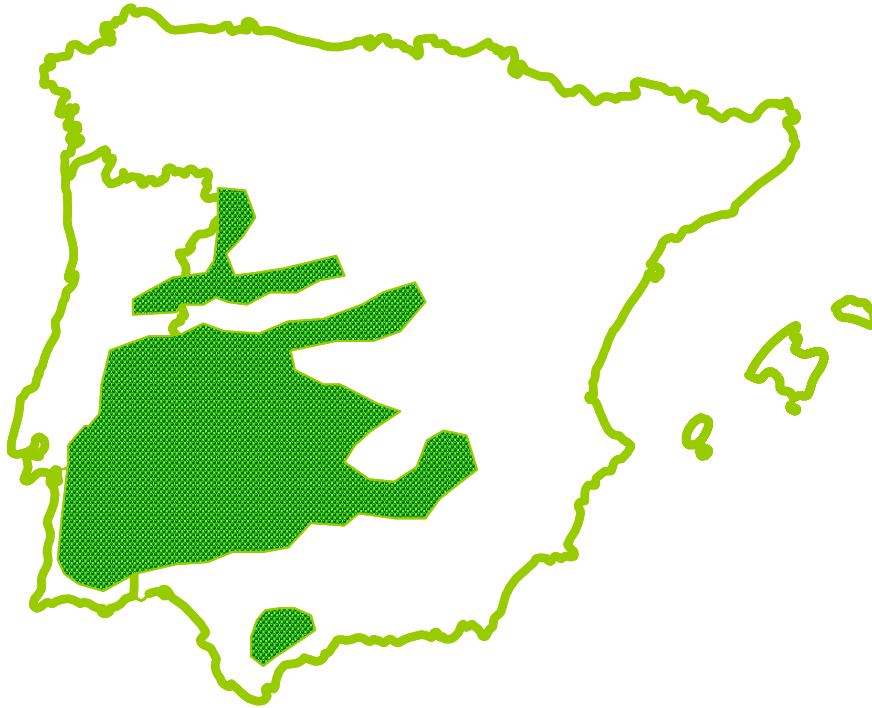


## The Dehesa system



Dehesas is the most extended silvopastoral system in Europe, with more than 3 millions hectares in SW Spain and Portugal (Eichhorn et al. 2006).

What is the **DEHESA** system?



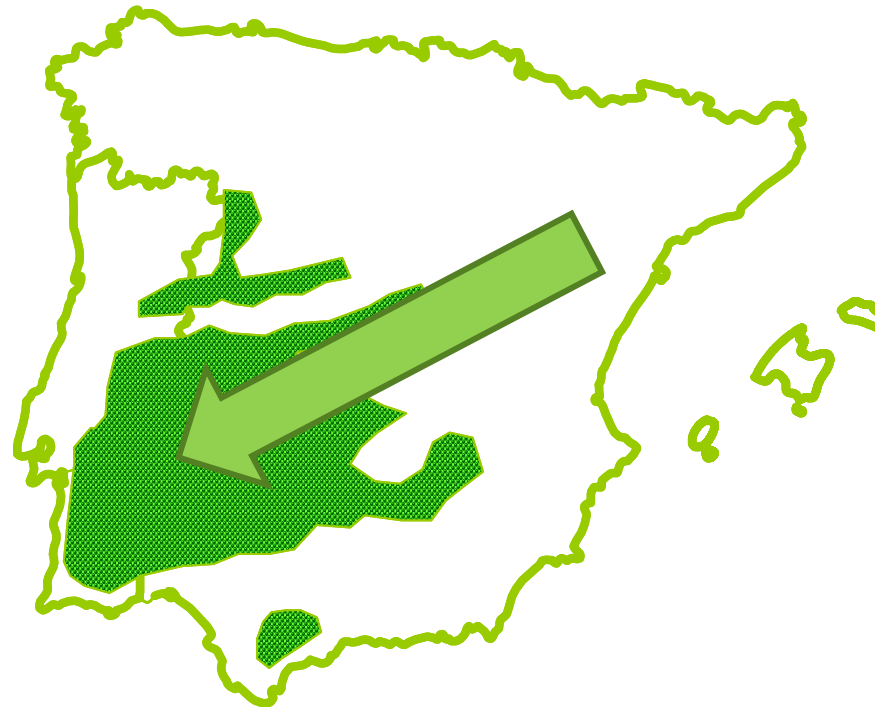
Grazed open oak woodlands:  
10-60 scattered trees per ha  
Native grasses as understory



## The Dehesa system: Threats



Historical trend

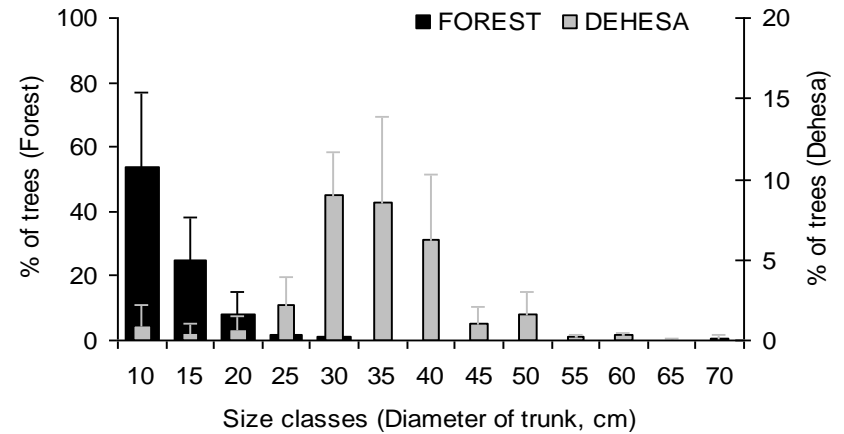


# The Dehesa system: Threats



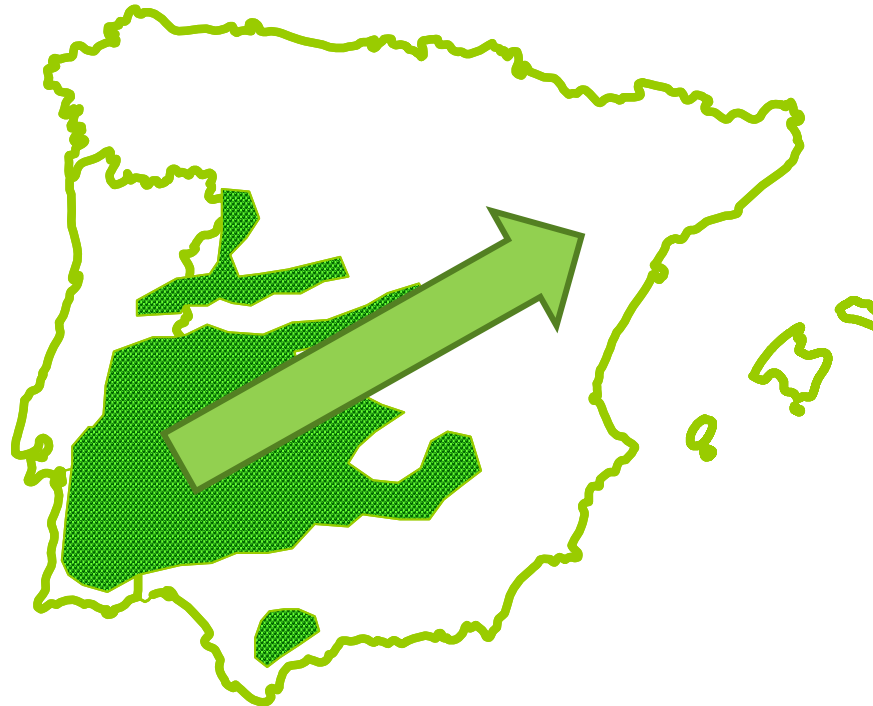
Over-aging tree population

Lack of regeneration



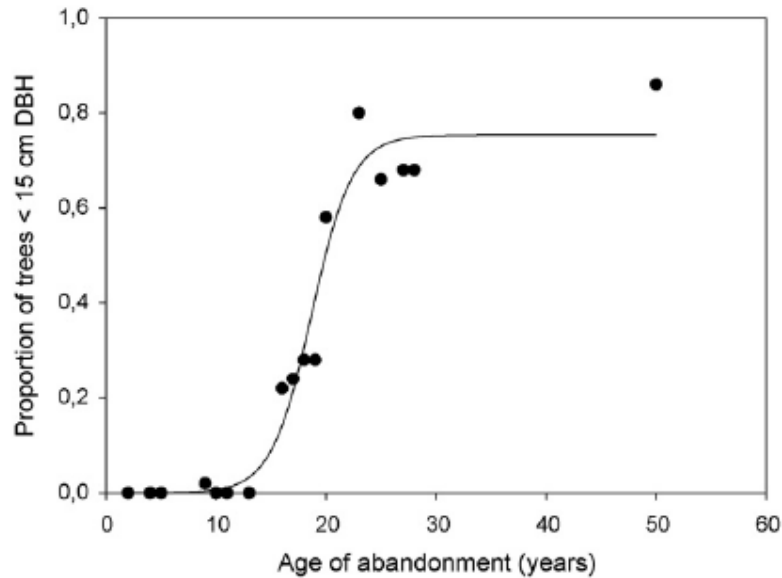


Could be possible?



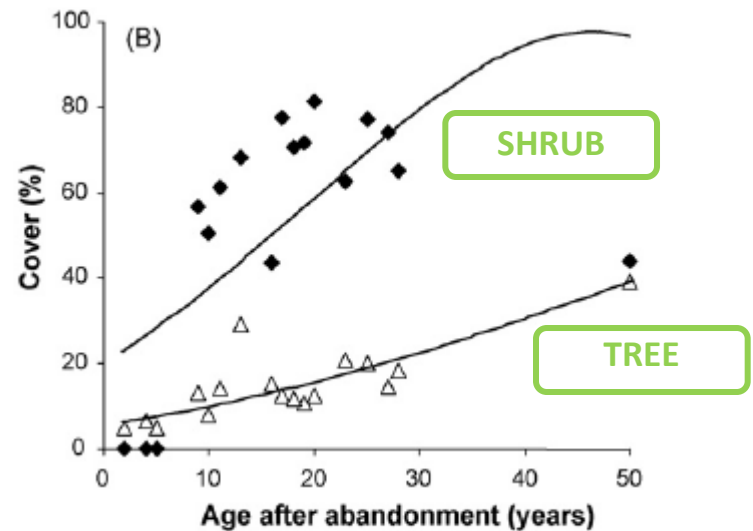


## The role of shrubs



Abandonment of Dehesa promote tree recruitment

Regeneration of Holm oak in Dehesa is associated with the presence of shrubs



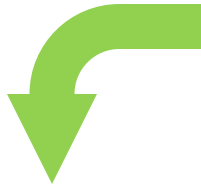


## The role of shrubs

Climate  
amelioration



Seedling protection  
against being  
grazed



Higher rates of  
acorn dispersers





## Questions



Dehesa system was created to promote the grass layer





## Questions



More plants for the same limited resources...

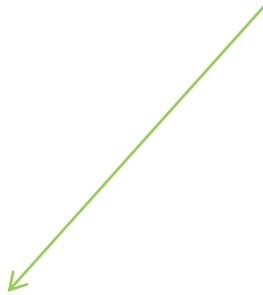




## Questions



...could influence the pasture quality???



PRODUCTION

SPECIES  
COMPOSITION

NUTRIENT  
CONTENT



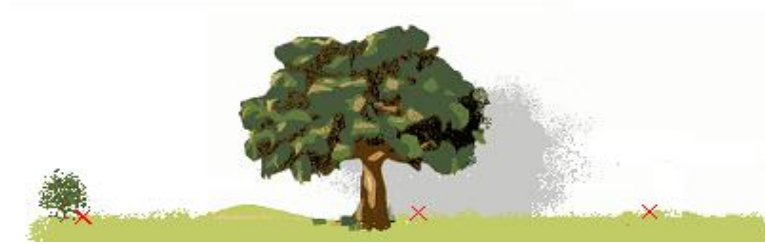
# Experimental Design

3 HABITAT x FARM

Shrub

Tree

Control



Parameters

PRODUCTION

Kg / ha

SPECIES  
COMPOSITION

Grasses  
Legumes  
Others

NUTRIENT  
CONTENT

N, P, K and Ca

6 FARMS

6 REPLICATES x HABITAT x FARM

Up to 108 sampling points





## Experimental Design



*Cistus ladanifer*

≠

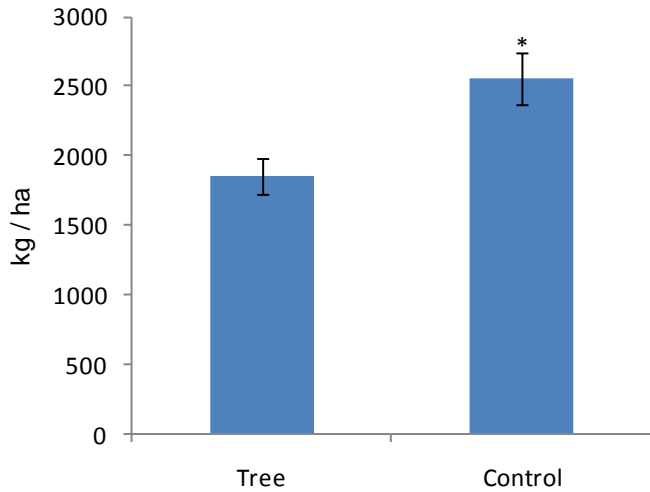


*Retama sphaerocapa*

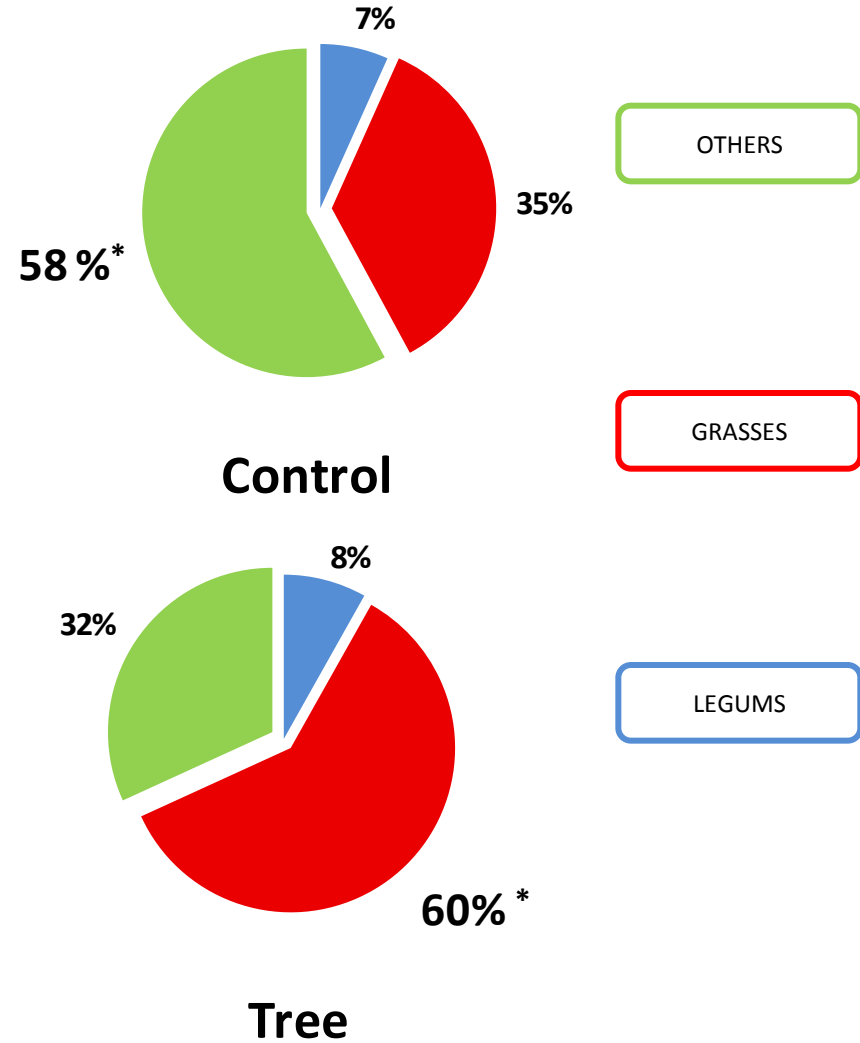


# effects of **TREES** on pasture **PRODUCTION** and **SPECIES** composition

## Production



## Species composition





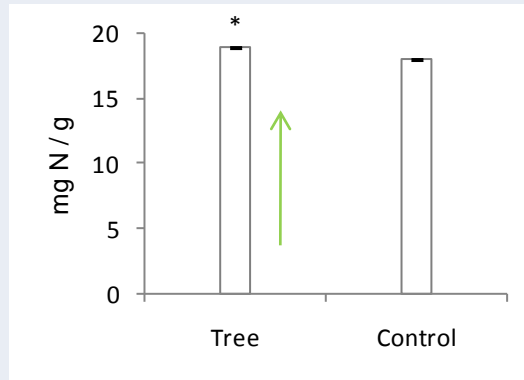
# effects of TREES on pasture NUTRIENT CONTENT

OTHERS

GRASSES

LEGUMS

## Nitrogen

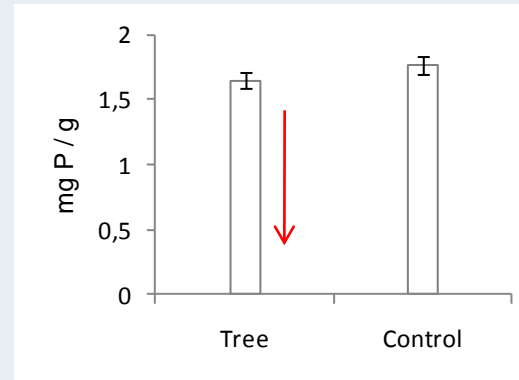


+ 4.97 %

+ 7.78 %

+ 3.48 %

## Phosphorus



- 5.63 %

- 0.55 %

- 12.36 %

## Potassium

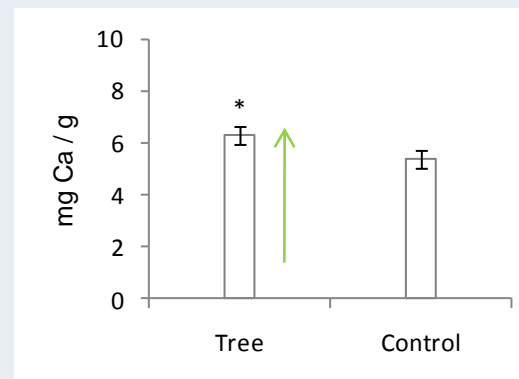


+ 19.77 % \*

+ 30.71 % \*

+ 18.00 % \*

## Calcium



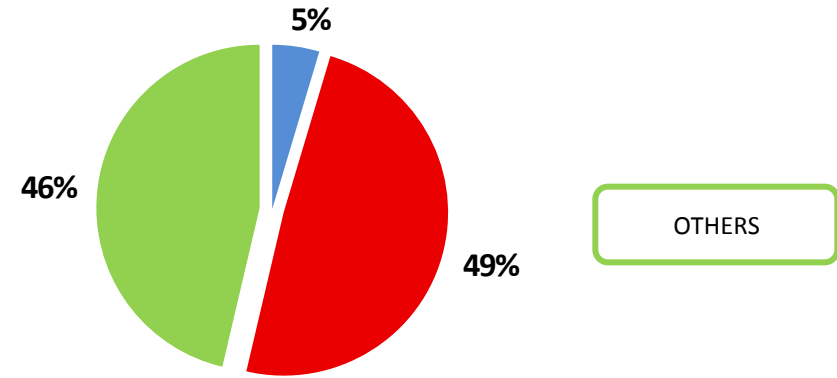
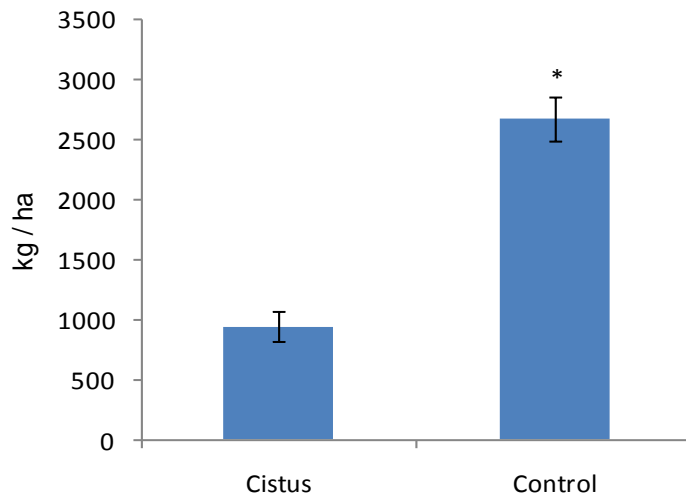
+ 13.11 %

+ 9.00 %

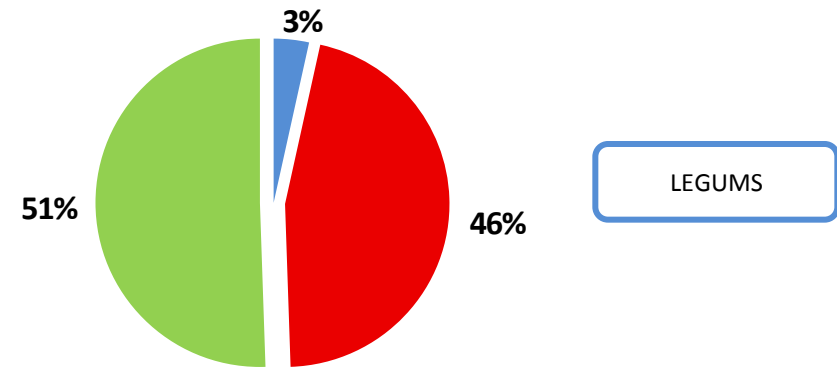
+ 28.4 % \*



# effects of *Cistus* on pasture **PRODUCTION** and **SPECIES** composition



**Control**



**Cistus**



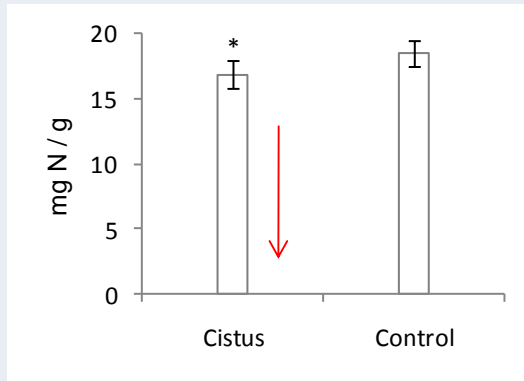
# effects of *CISTUS* on pasture NUTRIENT CONTENT

OTHERS

GRASSES

LEGUMS

## Nitrogen

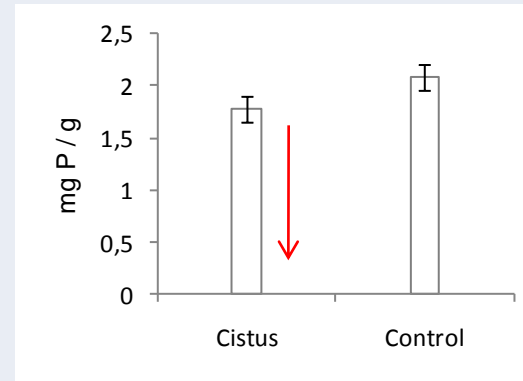


- 4.73 %

- 5.69 %

- 10.69 % \*

## Phosphorus

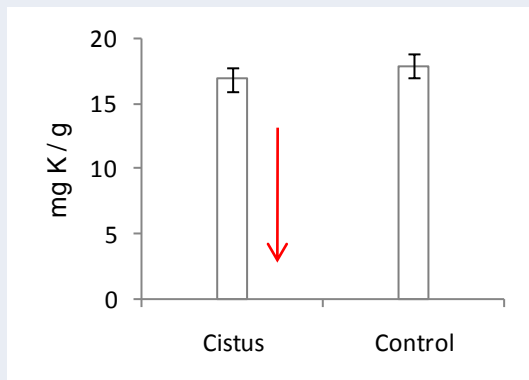


- 2.60 %

- 1.91 %

- 11.61 %

## Potassium

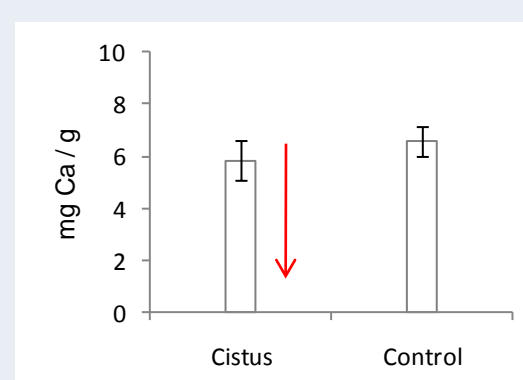


- 4.18 %

+ 5.75 %

+ 2.97 %

## Calcium



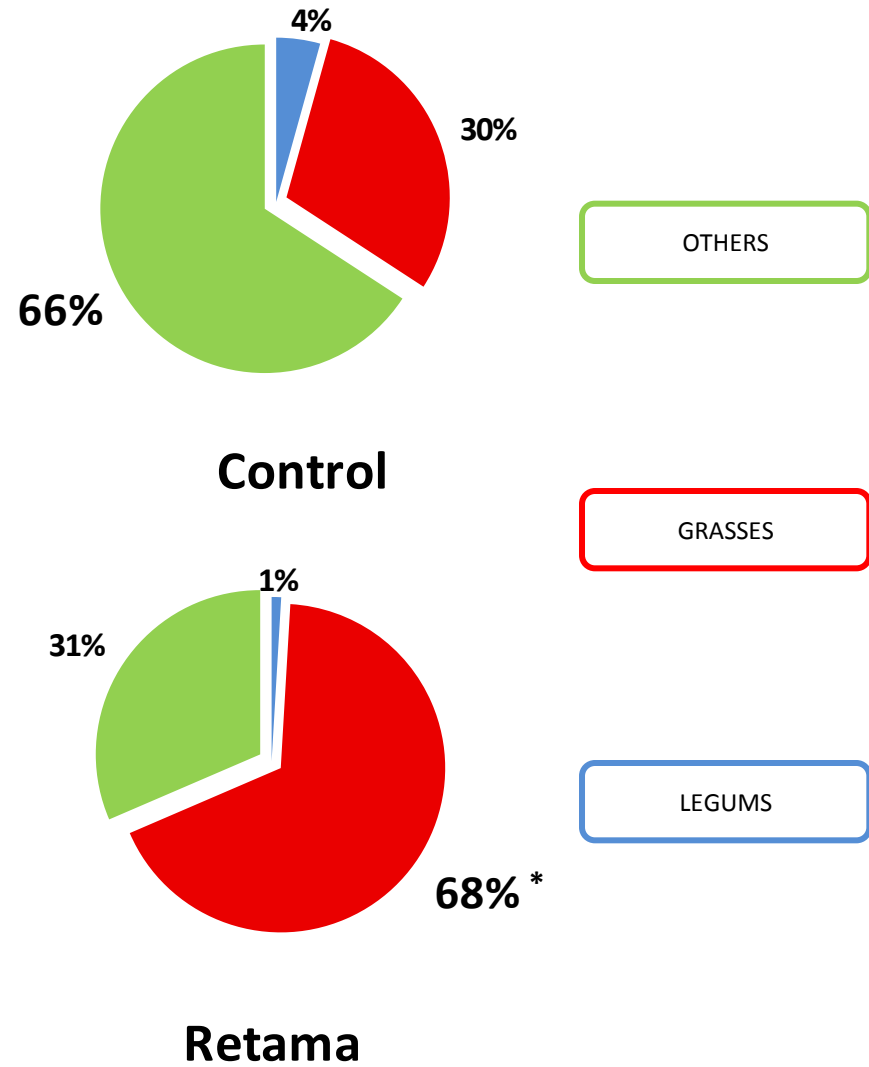
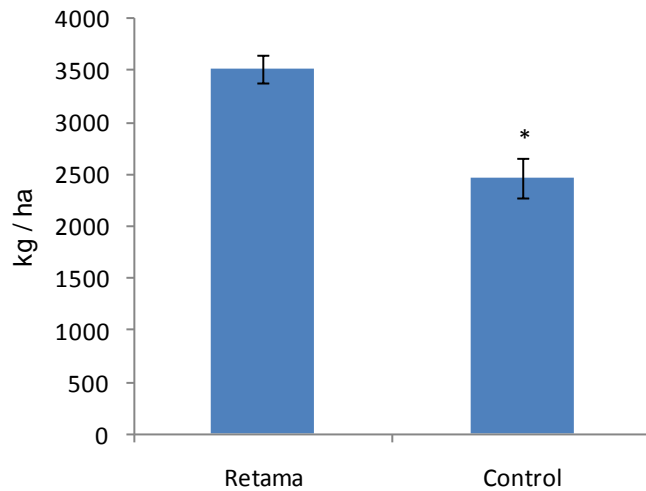
+ 11.45 %

- 17.07 %

- 3.13 %



# effects of *Retama* on pasture **PRODUCTION** and **SPECIES** composition





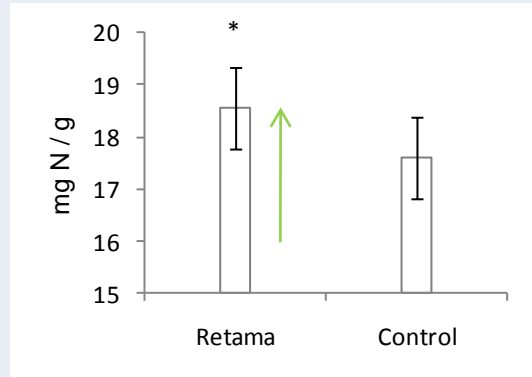
# effects of *RETAMA* on pasture **NUTRIENT CONTENT**

OTHERS

GRASSES

LEGUMS

## Nitrogen

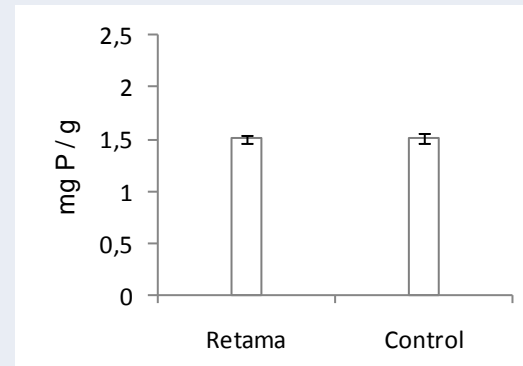


+ 1.21 %

+ 10.73 %

+ 6.77 % \*

## Phosphorus

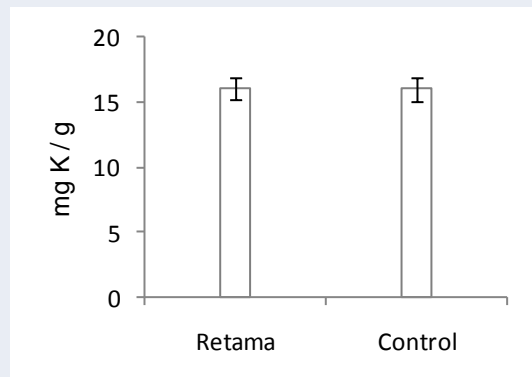


- 3.46 %

- 3.26 %

+ 7.48 %

## Potassium

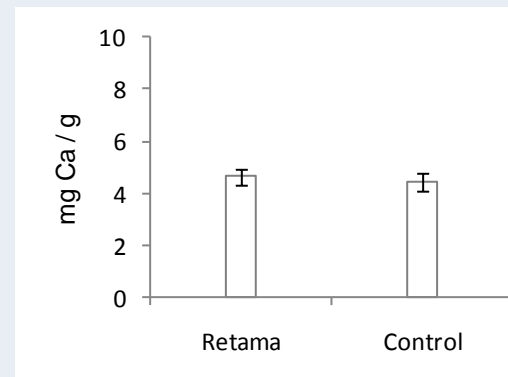


- 2.88 %

- 0.96 %

+ 7.17 %

## Calcium



- 31.70 %

+ 13.59 %

+ 50.92 % \*



## Conclusions

1. Trees showed a marked effect on pasture layer. Indeed they reduced the total production and shift the species composition compared with open areas. However pasture growing underneath trees improved their nutrient content specially N.
2. The effect of shrubs on pasture is very contrasted, from a quasi-complete annulations of pasture production (*Cistus*), up to a reinforcement of pasture yield and quality (*Retama*).
3. *Cistus* reduced significantly pasture production and quality with a significant diminution in N content but with no effects on species composition.
4. While *Retama* increased pasture production and quality, in terms of N content, with a similar effect than trees on species composition.
5. Overall, shrubs have marked effects on pasture layer with the potential to alter the species distribution and quality .



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Thanks for your attention

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