

# OAK DYNAMICS IN DEHESA SYSTEM. IS TREE REPLACEMENT AN URGENT TASK?

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## INTRODUCTION

Dehesa is the most extended agrosilvopastoral system in south Spain. Holm oak is the main tree species in this system and it provides various raw materials (wood, fuel, and fodder for wild animals and livestock), and contribute to a higher biodiversity at small scale. Continuous grazing, combined with other practices such as forage cultivation and burning, is associated with failures in oak recruitment and so with loss of tree cover. In this sense, dehesa is viewed as an unstable phase of woodland degradation. Taken into account that dehesa is a managed system, the question that emerges is if management practices could guarantee the long-term persistence of oak trees in the system. The aim of this paper is to analyze the evolution of holm oak density in dehesas in the last decades through in-plot dynamic analysis. In particular, we assess: 1) changes in tree density and canopy cover over last decades and 2) oak replacement rates.

### MATERIAL AND METHOD

16 dehesa farms in Andalusia

Farms size are between 49-417 ha. Olive orchard, cereal areas and other areas without tree were excluded.

Aerial photographs of two dates were used.

1977  
2011

Circular plots of 1 ha were used. Plots were placed in a square grid. Plot density was about 1 per 10 ha. Total plots: 200

T-tests of related sample were used to compare tree density and canopy between dates. To explore the relationship between variables we used Pearson correlations.

Trees within the plot were identified. Tree canopy was assumed circular.

Variables: Tree density  
Canopy cover  
Lost trees-Gained trees

### RESULTS

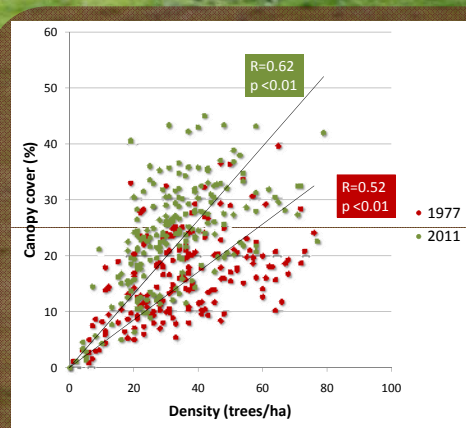
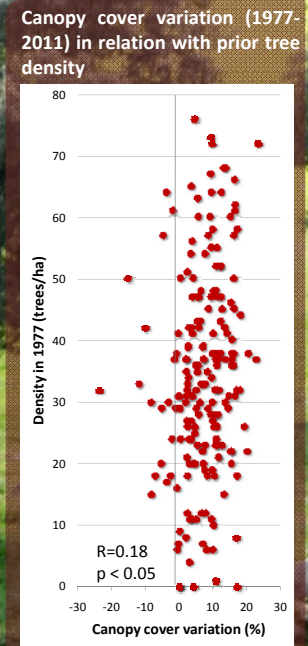
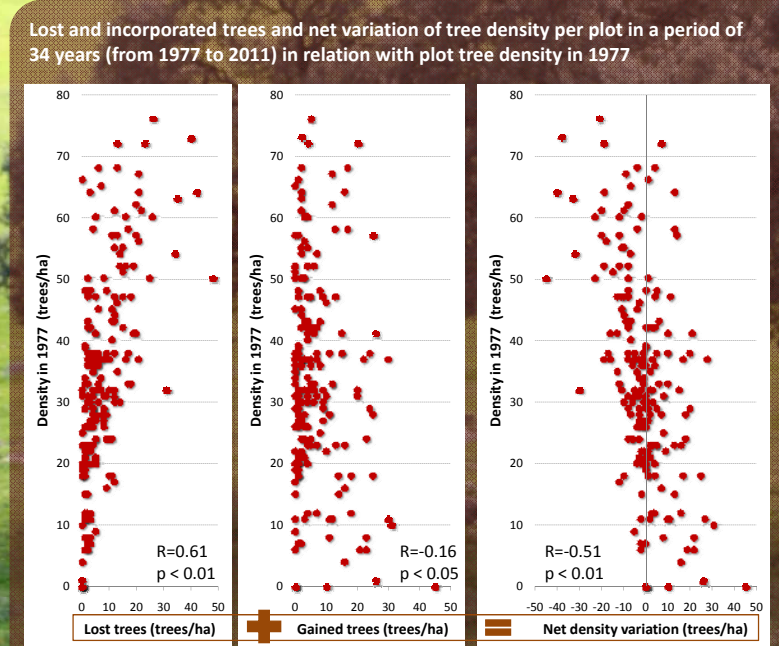
#### Density (trees/ha)

	1977	2011	T-test p
Overall Mean	34	33	0.17
N=200 Min-Max	0-76	0-79	
Córdoba Mean	40	33	<0.01
N=80 Min-Max	10-76	5-77	
Huelva Mean	31	32	0.30
N=80 Min-Max	0-72	0-79	
Sevilla Mean	28	32	<0.01
N=40 Min-Max	6-65	9-58	

#### Canopy cover (%)

	1977	2011	T-test p
Overall Mean	16	23	<0.01
N=200 Min-Max	0-40	0-45	
Córdoba Mean	14	24	<0.01
N=80 Min-Max	10-76	3-38	
Huelva Mean	17	22	<0.01
N=80 Min-Max	0-72	0-43	
Sevilla Mean	18	25	<0.01
N=40 Min-Max	6-65	9-45	



	Rate of tree loss (tree/ha) 1977-2011	Rate of tree recruitment (tree/ha) 1977-2011
Overall	7.7	6.5
Córdoba	10.6	3.9
Huelva	7.5	9.0
Sevilla	2.5	6.8

The annual rate of tree loss has been 0.23 tree/ha and the annual rate of tree recruitment 0.19 tree/ha.

Globally, tree density has reached similar values in both dates. Tree density has decreased significantly in areas with higher density in 1977 whilst has increased in those with previous low tree density.

Tree canopy cover has experienced an overall increase in this period observable at regional and local levels. The widespread increase in coverage has been mainly due to the growth of existing trees.

Management practices have been able to maintain similar level of tree density and keep canopy cover in levels suited for forage and acorn production through a tradeoff between tree loss and recruitment.