

Land Cover Changes in Western Mediterranean Areas by Integrating Data from National Censuses of Agriculture

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Introduction

In the last decades, Mediterranean agricultural systems have experienced significant changes in land use and agricultural practices under the pressure of the worldwide market competition, the effects of the global changes and the need to contain the environmental harms (Bajocco et al. 2012). The Mediterranean area is characterized by peculiar traits (climate, soil, orography, traditions, etc.) which are rooted in history and allow us to distinguish this agriculture to those developed in the different European regions (Debolini et al., 2018).

The aim of this study is to describe and interpret the agroecosystem dynamics of Western Mediterranean areas both in terms of land-use (agricultural, urban, natural, etc.) and land-cover changes (cereals, forage, vegetables, etc.) by using the data from the agricultural censuses of France (FR), Italy (IT), Portugal (PT) and Spain (ES) over the 2000-2010 period.

Materials and Methods

This work fits with the aims of the Divercrop UE project (<https://divercropblog.wordpress.com/>), which established an integrated data-base containing the official statistics of agriculture for seven Mediterranean countries (included Malta, Morocco and Tunisia). The Divercrop project provided us a valuable starting point to perform in-depth analyses by harmonizing an enormous amount of data and information in a single data-base, but some steps still remained to be overcome.

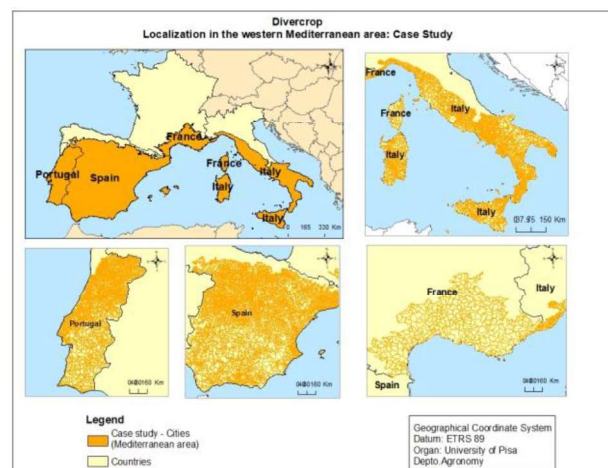


Fig. 1 - The Western Mediterranean area taken in consideration and the detail of LUs for the different countries

First, we chose to limit the analysis to European countries only in order to improve the accuracy and the homogeneity of the data to process. Secondly, we matched each record of data-base (single municipality) to its geographical position (Land Unit = LU) so to make possible the selection of the only portions of territory that can be classified as Mediterranean (Fig. 1), according to the EU classification (Sundseth,

2009). Third, we had to verify the agreement of the different categories of crop grouping used in the different national agricultural censuses and to integrate any missing information.

Here, only the data of Utilized Agricultural Area (UAA), Cereals (Cer), Industrial Crops (InC), Vegetables (Veg) and Vineyards (Vin) are discussed (Tab. 1)

Results

The studied area included almost the entire surface of Portugal (92%) and Spain (85%), about half of Italy (53%) and a little portion of France (12%). The total number of LUs was equal to 14375 of which 3312 (23% of the total) fell in PT, 7239 (50%) in ES, 3409 (24%) in IT and only 415 (3%) in FR. The comparison among the size of land units (municipalities) used in the census for the four countries showed appreciable differences (from 2559 ha of PT to 18885 ha of FR as average surface of a single LU).

The results of the comparison in space and time of the different Western Mediterranean countries are shown in Table 1. Generally, all the percentage changes were negative with the only exception of Italy where an increase of UUA (+0.1%) and Veg (+16.4%) were recorded in 2010. The InC was the crop grouping that showed the highest reduction (-25.5% in ES, -57.3 in IT, -66.9 in PT and -72.4% in FR), followed by the Vin with a decrease that ranged from -11.1% (IT) to -19.7% (FR). Among the countries, ES pointed out the lowest differences between 2010 and 2000, whereas PT was the country where the losses of surface were more considerable (-23.2% of UAA, -41.0% of Cer, -66.9% of InC, -7.6% of Veg and -16.4% of Vin).

Type	Spain (ES)			Portugal (PT)			France (FR)			Italy (IT)		
	2000	2010	Δ (%)	2000	2010	Δ (%)	2000	2010	Δ (%)	2000	2010	Δ (%)
UAA	24257	22103	-8.9	1930	1482	-23.2	2245	2191	-2.4	7522	7525	+0.1
Cer	6930	6240	-10.0	572	337	-41.0	322	315	-2.2	2075	1660	-20.0
InC	1273	948	-25.5	71	24	-66.9	93	26	-72.4	179	77	-57.3
Veg	272	228	-16.1	48	44	-7.6	29	22	-23.0	165	192	+16.4
Vin	996	842	-15.5	189	158	-16.4	442	355	-19.7	425	378	-11.1

Tab. 1 – The surface occupied by different soil use and cover types in the years 2000 and 2010 (see the text for abbreviations). Δ is the percentage change calculated as the difference between the 2010 value and the 2000 value divided by the 2000 value: $(2010 - 2000) / 2000$

Although the differences among the countries were not negligible, some trends seemed to be clear and could be useful to define a pattern of technical and operating decision taken by farmers in response to the action of common of environmental-societal-economic driving forces.

Conclusions

The survey on land-use and land-cover changes allows us to evaluate the trajectory drawn by agriculture in the last years and the effects that these changes can cause on several important features such as food system self-sufficiency, soil erosion restraint, soil organic matter conservation, biodiversity preservation, water consumption and land abandonment. These aspects will be essential to assess the sustainability of the current Mediterranean agroecosystems and to verify if they can meet the rising needs of human communities.

References

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