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Introduction

The new post-2020 CAP will give more importance to the promotion of agricultural practices that are beneficial for the climate and the environment, not only through Pillar II, but also through Pillar I through the development of the new approach that involves the inclusion of Eco-schemes, whose objectives are to give an effective response to many of the needs that have been identified as environmental issues and increase support to the income of those farms that provide the greatest benefits to society.

In order to demonstrate the effectiveness of the practices promoted by mentioned operations in achieving the objectives established by Measure 10 of the Andalusian Rural Development Program, for the purpose of justifying the suitability of their implementation and development, and continue promoting their future application in the post-2020 CAP, the present study analyzes the impact that Conservation Agriculture practices, included in operations 10.1.4 and 10.1.7, have on agricultural holdings, through the application of a set of indicators based on the INSPIA methodology, which assesses environmental, economic and social sustainability of farms.

Material and Methods

In order to study the effectiveness of Operations 10.1.4 and 10.1.7, a demonstration farms network has been established, which could potentially benefit from the mentioned operations. In the present case, the crops studied have been durum wheat (*Triticum aestivum*) in rainfed and olive groves (*Olea europaea*) both in rainfed and irrigated areas. In order to also carry out an analysis compared with those farms that do not apply Conservation Agriculture practices, the network has considered plots managed under conventional tillage (Figure 1).

To calculate the sustainability of the farms studied, the methodology collected by Triviño-Tarradas *et al.* (2019), which uses 31 indicators that cover the three study areas of a farm sustainability. The values are calculated through direct samples in the field and information obtained by farmers directly from the calendar of operations. The value of each indicator is added to obtain a global sustainability value which is composed of an environmental sustainability value, a social sustainability value and an economic sustainability value. In the section on improving biodiversity, a new indicator has been added, the Shannon Biodiversity Index (Shannon and Weaver, 1949). This index is probably the most frequently used in community ecology. It is obtained using the number of individuals of each morphospecies. The Shannon index value is equal to 0 when the sample contains only one morphospecies and equals 1 when there is a great abundance of morphospecies, and they are represented by the same number of individuals. Data collection was carried out in the 2014/2015 season and in the 2018/2019 season.

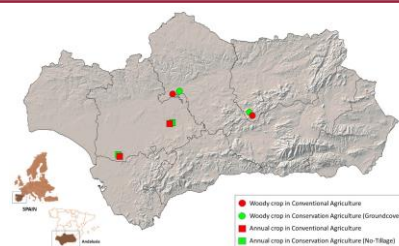


Figure 1. Location of the analysed farms.



Picture 1. Olives with groundcovers.

Results

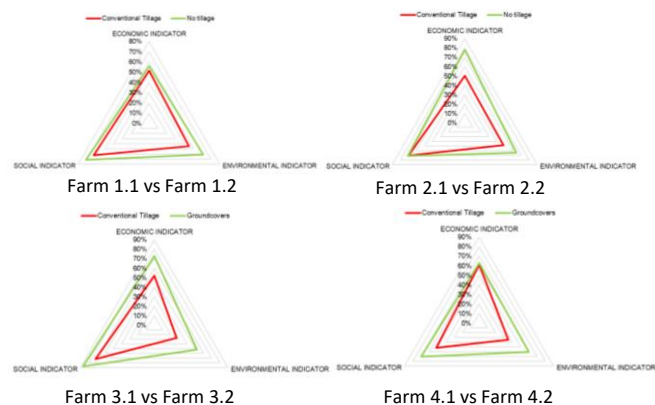


Figure 2. Values of the added indicators by sustainability areas in the studied farms

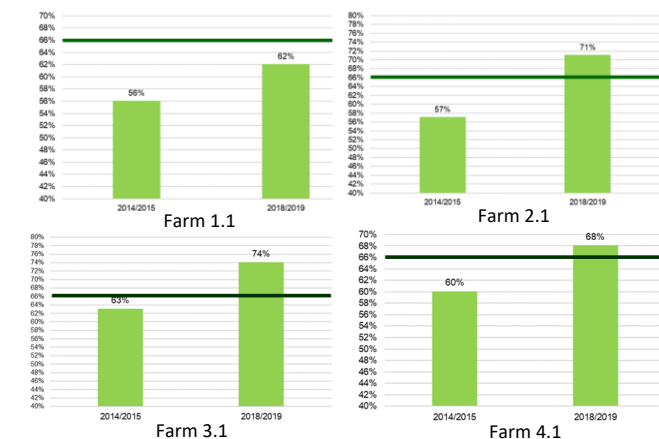


Figure 3. Temporal evolution of the global sustainability indicator in the plots under Conservation Agriculture (the green line marks the threshold from which the farm is considered sustainable).

Conclusions

It has been demonstrated that Conservation Agriculture, for agricultural ecosystems, is a more sustainable management system from all perspectives (environmental, economic and social) than conventional management based on tillage. It should be noted that soil indicators in Conservation Agriculture are a lot higher than those obtained in tilled plots. In the economic section, it stands out the fact that, in general, the plots in Conservation Agriculture have a higher profitability as a result of the lower agricultural operations costs, since there is no tillage. This fact also encourages energy indicators to be more favourable in Conservation Agriculture.

The carried out analysis has shown that the continued practice of Conservation Agriculture has improved the plots sustainability, after several seasons. Based on this, it can be stated that the implementation and development of this practice through multi-year programs can be a very effective measure in order to achieve objectives of the strategies proposed in Andalusian agriculture.

Acknowledgements

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