Graphical representation and monitoring of the agricultural sustainability on olive orchards and vineyards; the suitability of CA

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Introduction

Agricultural sustainability could be monitored through the assessment implementation of a set of Best Management Practices (BMPs) that are economically viable, environmentally safe, and socially acceptable. There is some difficulty to represent graphically sustainability assessment results. However, the assessment of environmental, social and economic factors requires an understanding of all the relationships among their multiple dependent and independent variables.

In the literature, there are some successful schemes or methodologies to monitor specific issues in agricultural systems, that try to show in a graphical way the sustainability index, representing sustainability from a holistic perspective.

These tools help farmers monitor their farm sustainability, helping them with their decision-making and allowing them to improve their performance in the field, through the implementation of a set of Best Management Practices (BMPs) that improved the farmed environment for biodiversity and protect and enhance the natural capital on which productivity relies.

Objective

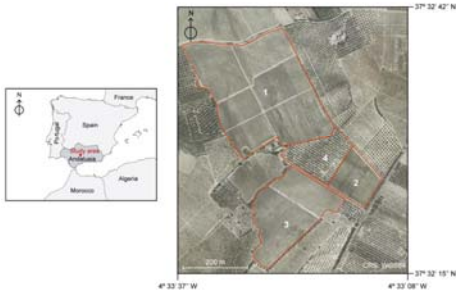
To evaluate agricultural sustainability through graphical-polygonal representation and alphanumeric data, on the permanent cropped land in Southern Spain.

Graphical layouts to represent agricultural Sustainability Index

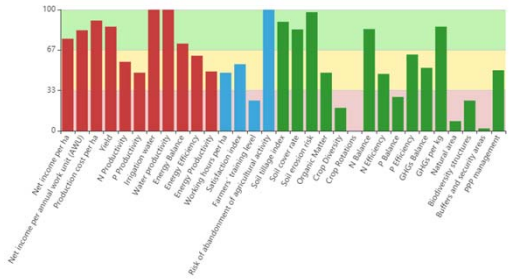
The analysis of most systems needs an understanding of the relationship built among the different variables represented via indicators. The utilization of a graphical layout representation is a powerful tool in gaining understanding in any field, because it allows the visualization of the relationships among the different monitored variables. In this context, some authors use ternary diagrams, whereas others prefer polygonal or radar ones.

Materials and methods

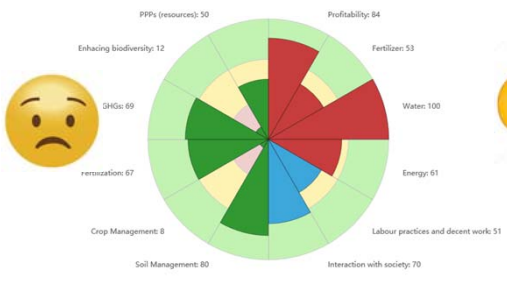
A mixed farm of vineyard and olive-groves was chosen as average-role-model farm for sustainability assessment representation (from 2013/2014 to 2017/2018) based on BMPs (Picture 1). The selected graphical assessment was the INSPIA model, since it provides different types of diagrams: bar diagram (Picture 2) and radar diagram.



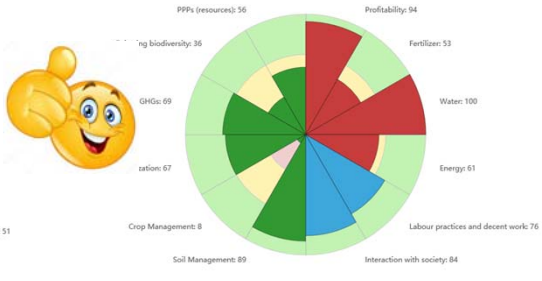
Picture 1. Location of the study farm.



Picture 2. Bar diagram on basic sustainability indicators.



Picture 3. Aggregated indicators and global Sustainability Index (agricultural season 2014/2015).



Picture 4. Aggregated indicators and global Sustainability Index (agricultural season 2016/2017).

Indicators' value come from what farmers do in practice to farm the land. Hence, INSPIA promotes a set of farming practices that have been demonstrated to improve the farmed environment for biodiversity, as well as other ecosystem services.

The optimal sustainability index value is often related to a set of uniformly high aggregated indicators (radar graph). This can be easily shown by Picture 3 and 4, corresponding each of them to the worse (Picture 3) and the best (Picture 4) monitored agricultural season respectively, according to the implementation of the BMPs and their calculated indicators.

Conclusions

Providing farmers and stakeholders not only with a numbered sustainability index but with a global graph which compile information on all aggregated indicators is optimal. Having a better understanding of the sustainability graphical representation serves farmers as a guide to contribute towards global sustainability challenges.