

Implementation of sustainable irrigation strategies for almond orchards through a participatory approach

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Traditionally, almond production in Spain has taken place under rain-fed conditions in marginal soils. The recent surge in almond demand worldwide has led to the intensification of almond production with new plantations under irrigation, increasing the irrigated area by 23% between 2014 and 2015. Nevertheless, although there has been progress in irrigation management research in almond, adoption of modern irrigation techniques by farmers has been slow. **Farmers are still far from implementing a sustainable irrigation management** due to a reliance on previous rain-fed crop-management know-how. Under the framework of the LIFE+ IRRIMAN project, through a **participatory approach**, **sustainable irrigation strategies for almond orchards** are being **designed, implemented, validated and disseminated**.

At this phase of the project, we have focused on the first step of the participatory approach by setting up a demonstration effort in 2014 to implement sustainable irrigation strategies for almond in a new area.

Involvement of farmers, irrigation community, public administration and researchers



'Genil-Cabra Santaella' Irrigation Scheme

Demonstration farm

- Cv. 'Antoñeta'
- Area: 2 ha
- Year of plantation: 2008
- Plant density: 208 trees/ha (8 m × 6 m)

SECTOR B
Farmer irrigation strategy (F)

SECTOR A
Regulated deficit irrigation (RDI)

Month	Jn.	Fb.	Mr.	Ap.	My	Jn.	Jl.	Ag.	Sp.	Oc.	No	Dc.
Deficit irrigation												
Fruit rapid growth												
Post-harvest												

■ Control trees (30% more water than RDI)
■ Monitoring trees

During the growing season, several parameters were monitored to assess the crop response to the irrigation regimes.

Soil water content

Midday stem water potential

Vegetative growth

Yield and yield components

In 2015, RDI yield increased significantly (77%; Figure 1a) relative to farmer's yield in the previous year, leading to an increase in total gross margin of around 4,500 € ha⁻¹ (constant prices). However, there were no significant differences between RDI and F treatments (Figure 1a), because the farmer, based on our results of the previous year, changed his irrigation practice to follow closely our RDI program, ending with about the same applied amounts (Figure 1b). **The speed and degree of uptake of the new irrigation strategy by the farmer highlights the success of the approach.**

A **meeting with all the stakeholders** was held at the end of this first phase to analyze and discuss the results, to promote almond irrigation scheduling, and to develop a strategic plan for the dissemination phase.

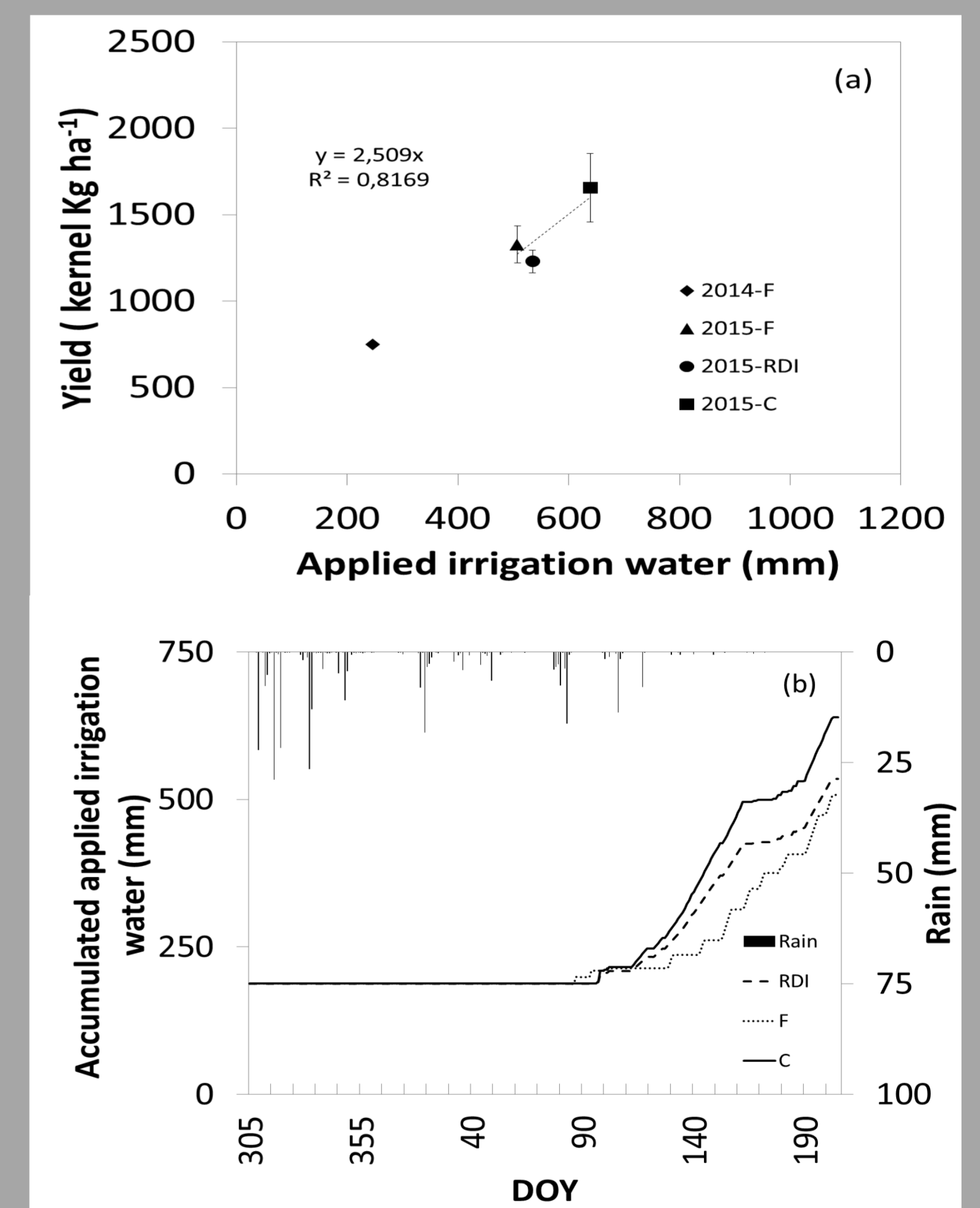


Figure 1. (a) Relationship between kernel yield and applied irrigation water; (b) Accumulated applied irrigation water throughout the season 2015

Conclusions

The participatory approach, including on-farm demonstration, was successful as a first step of the implementation process of innovative irrigation practices for almonds. The dialogue between farmers and scientists allowed adaptation of the new management strategies to local conditions and challenges. The use of a **participatory approach for the design, implementation and dissemination of innovative irrigation strategies in traditional rain fed crops may play a crucial role.**

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