Water saving on a gravity-flow irrigation district. Challenges and issues on Lis Valley, Portugal

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Abstract

In consequence of global change, society is urging water savings by irrigated agriculture, through the decrease of water consumption.The major challenge is to maintain or increase a sustainable agricultural production with less water . It requires the adaptation of irrigated agriculture, through a change of technology and practices compatible with the farmers' technical know-how and farms economic sustainability. Collective irrigation districts play a decisive role in Portuguese agriculture, ensuring socio-economic sustainability. These systems comprise the conveyance level, managed by the Water Users Association(WUA), the off-farm distribution level, managed by the WUA or a group of farmers, and the field level application system, managed by the farmer. The performance of the delivery system is not only assessed for hydraulic effectiveness in water transport, as the off-farm conveyance and distribution system should deliver the water according to adequate, reliable, and equitable criteria, which is a precondition for good water management and land productivity. Therefore, improvings on district level water savings and farmers income require interconnected well-functioning of the various parts in network.

This paper presents results of the Lis Valley Water Management Operational Group, integrated on the agricultural European Innovation Partnership (EIP-AGRI), which aims to innovate the water management process and achieve a sustainable agricultural development. Lis Valley irrigation district has a gravity fed conveyance system supplied by Lis river and its tributaries, recharged by water pumping from rivers and drainage ditches. The Operational Group work-plan is focused on the monitoring of the collective supply network which includes the operative assessment and measurements of the district management sectors supply discharge, the assessment of irrigation and drainage water quality, and the evaluation of the irrigated areas, to identify water management problems and its feasible solutions. On-farm management is evaluated on experimental fields set in private farmers, considering sprinkler and micro-irrigation of vegetables, surface or sprinkler irrigation with fodder corn and permanent pastures, paddy rice, and drip irrigation of apple fruits.

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This contribution presents the monitoring methodologies, the main results already obtained and the issues about water saving and water productivity. Some conclusions about water saving on a gravity-flow irrigation district have been obtained. Improvements and innovations are required on several aspects: a) improve the quality of hydraulic infrastructures to reduce water losses, better water flow control, being advisable more automatic control equipment in the networks; b) improve the management of collective networks through the implementation of operational plans to adjust the demand for water in each irrigation season with the corresponding distribution, which requires the integration of diverse information in real time; c) improve the on-farm system design with better water application control and maintenance procedures, reducing labour and increasing the distribution uniformity; d) improve the irrigation scheduling through monitoring systems, using automatic weather stations combined with soil moisture devices or crop remote sensing; and e) improving the reuse of excess flow at the downstream end of irrigated fields, or from drainage ditches, with a better control of water quality.

Keywords: Innovation, Operational Groups, Lis Valley, gravity, flow irrigation district, irrigation water saving, irrigation modernization