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Innovative irrigation strategies for rice in the Mediterranean areas

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Rice is the world's most important food crop, as it is a staple food for more than half of the world's population, and the global demand for rice is expected to increase. More than 1,000,000 hectares in the Mediterranean basin are devoted to rice cultivation. The most important producing countries are Italy (IT) and Spain (SP) in Europe (over 310,000 ha), and Egypt (EG) and Turkey (TR) among non-EU countries (over 600,000 ha). In the Mediterranean region, rice production is of great socio-economic and environmental importance, as rice is often a crucial product for internal consumption and export, especially in Egypt, where it is considered strategic for food security. Despite of this, the peculiar flooding conditions in which rice is traditionally grown lead to the use of huge water volumes, as well as to the potential release of greenhouse gases and pesticides into the environment. For this reason, the introduction of water-saving irrigation strategies could reduce water consumption and decrease the harmful environmental impacts associated with rice flooding, while maintaining yield and rice grain quality.

In the context of the MEDWATERICE project (https://www.medwaterice.org/; PRIMA-2018), alternative irrigation methods to WFL were tested in case studies implemented in five Mediterranean countries (Italy, Spain, Portugal, Turkey, Egypt). Irrigation strategies for each CS were selected with the support of local Stake-Holder groups and applied in experimental fields measuring/estimating all the water balance terms on a daily basis. Wet seeding and alternate wetting and drying (AWD), dry seeding and delayed flooding (DFL), reduction of inlet/outlet discharges (WIR), a better control of ponding water level through automated gates (DFL-aut), hybrid irrigation (HYBRID), sprinkler irrigation (SPRINKLER), surface drip (DRIP) and subsurface drip

irrigation (SDI) were implemented for at least two years in the period 2019-2021 alongside the traditional WFL, to investigate their environmental and economic sustainability and social acceptability.