

## Irrigation management strategies to increase water productivity in *Oryza sativa* (rice) in Uruguay

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### ABSTRACT

Traditional rice irrigation systems in Uruguay are fully irrigated and early continuously flooded irrigation accounts for a high volume of water used. The purpose of this study was to determine irrigation techniques that increase water productivity (WP) allowing a reduction in water input without negatively affecting grain yield in Uruguay. Ten experiments were conducted over a six-year period from 2009 to 2015, in three experimental units located among the major rice growing regions. Treatments included: early continuous flooding (C), alternate wetting and drying (AWD), intermittent flooding until panicle initiation (IP) and intermittent flooding during all crop growth period (I). All treatments were planted on dry soil. In treatment C flooding started 15-20 days after emergence and a water layer of 10 cm above the soil surface was maintained throughout all the crop cycle. In treatments IP and I, the water level alternated between 10 cm and 0 cm and was re-established when the soil was still saturated. The AWD treatment alternated saturated and unsaturated soil conditions until panicle initiation. IP and I over three seasons led to significant savings in irrigation water inputs in the North and Central regions (averaged 35% or - 3986 m<sup>3</sup> ha<sup>-1</sup>) in relation to C. In the East region, AWD allowed for a 29% (-2067 m<sup>3</sup> ha<sup>-1</sup>) water saving in relation to the control but determined a significant yield loss of 1339 kg rice ha<sup>-1</sup> (15% reduction) in relation to C. WP was increased by 23% in IP and 62% in I, in relation to the control C. Whole grain percentage was significantly reduced with I in the North region. Techniques that maintained the soil water at saturated conditions like intermittent flooding, allowed a reduction of water input with no significant effects on grain yield, which led to a significant increase in WP.

**Key words:** Rice, Irrigation, AWD, Water productivity