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Farmers’ and academia’s views”

## The effect of alternate-wetting-and-drying irrigation (AWD) on rice phenology and yield

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### Abstract

In the Vietnamese Mekong Delta, an alternative water management strategy is needed to maintain the productivity and sustainability of triple cropping rice (*Oryza sativa*) systems. During the dry season, water saving irrigation technologies, such as alternate wetting and drying (AWD), reduce methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions due to periodic soil aeration while reducing freshwater use. To evaluate potential yield penalties caused by AWD, field trials were established over two years in the Mekong Delta, Vietnam, in which 20 rice varieties were grown under fully irrigated and ‘safe’ AWD conditions and yield and yield components were determined. The varieties comprised a selection of twenty commonly cultivated and soon to be released Vietnamese rice varieties and were grown for two successive dry seasons at the Loc Troi agricultural research station in collaboration with the BMBF project, RiSaWa. During both seasons we measured yield components, yield, and water level. We observed a slight, but significant ( $p > 0.001$ ), yield reduction, 7% on average, across all varieties grown under AWD. Analysis of yield components showed that across all varieties under AWD, rice plants grew more tillers, produced fewer panicles and spikelets, suffered greater sterility, and had a lower 1000 grain weight. Varietal difference could in part be attributed to varying development rates, which exposed certain varieties to a more severe water deficit during key phenological stages. Based on the number of days that overlapped with a phenological stage of a variety, we found that there was a significant ( $p > 0.05$ ) relationship between the number of days exposed to the dry down period during panicle initiation and the spikelet number. Considering the field is already kept flooded during flowering, practitioners of AWD should take other phenological stages into account when scheduling irrigation events. Potentially under ‘safe’ AWD, the start of AWD could be delayed until after panicle initiation, and the field could be allowed to dry during flowering.

**Keywords:** Alternate Wetting and Drying, Vietnamese Mekong Delta, Yield Component Compensation