Entry No. IRRC-0568

Category	: International Rice Research Conference
Select Theme	: Climate change and environmental sustainability
Endorsement email	:
Keyword 1	: Mitigation of climate change
Keyword 2	: Climate smart agriculture
Keyword 3	: Carbon and nitrogen cycles
Title of Entry	: Implementation of Alternate Wetting and Drying (AWD) system in European rice cultivation: methane mitigation and impacts on grain yield
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Select only one type of presentation	: 15 minute oral presentation
Abstract	: Paddy rice is one of the most important sources of anthropogenic CH4 emissions. The irrigation system Alternate Wetting and Drying (AWD) has been studied elsewhere as a measure to effectively mitigate CH4 emissions showing variable results in mitigation and yield impact. Therefore, to optimize the implementation of AWD, studies based on country-specific conditions need to be conducted. In Ebre Delta (Catalonia, NE Spain) a study was carried out to assess the effect of AWD on CH4 emissions, global warming potential (GWP) and grain yield over nine European rice cultivars, in comparison with permanent flooding (PF). A two-year field experiment (years 2016, 2017) was conducted following a split-plot design with four replicates, in which the main plot was water management (AWD vs PF) and the subplot, the cultivars. AWD was implemented only during the vegetative phase and in a manner that plots were reflooded at the end of each draining period when soil potential reached – 30 KPa in 2016, and – 20 KPa in 2017, given the important yield losses observed. Greenhouse gases (GHG), i.e. CH4 and N2O, were periodically sampled during the growing season in one cultivar; yield was measured in all of them. GHG emission rates were calculated and statistically analyzed using HMR package in R software whereas ANOVA was used to test yield effect. The results showed that AWD significantly reduced CH4 emissions by 80% and 95% in 2016 (0.09 vs 0.41 g CH4 m-2) and 2017 (0.27 vs 5.0 g C-CH4 m-2), respectively. Remarkable low CH4 emissions were found in 2016 in both AWD and PF. N2O emissions were almost negligible in the two treatments (<0.0014 g N2O m-2. Overall, GWP was reduced by 41% in 2016 and by 95% in 2017, being the different reductions explained by the low CH4 emissions in PF in 2016. Regarding grain yield, AWD implemented at – 30 KPa significantly reduced grain yield by 16% across all

cultivars whereas a “safe” AWD (refloodings at – 20 KPa) did not significantly impact yield. Therefore, our study concludes a “safe” implementation of AWD system can effectively mitigate GWP of European rice

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