Do Alternate Wetting and Drying Irrigation Technologies and Nitrogen Rates Affect Rice Sheath Blight?

10 April 2017

Adam H Sparks 1 , Nancy P Castilla 2 , Bjoern O Sander 2

*1. University of Southern Queensland, Toowoomba, QLD, Australia*  
*2. Crop and Environmental Sciences Division, International Rice Research Institute, Los Baños, Laguna, Philippines*

Water and nitrogen management play vital roles in rice production. However, the mismanagement of either may trigger plant disease epidemics such as sheath blight of rice, caused by Rhizoctonia solani, which is favoured by wet conditions, high relative humidity, and high nitrogen fertiliser levels.

In order to understand how different combinations of water and nitrogen management affect sheath blight epidemics, we conducted two separate split-plot experiments with two irrigation regimes in the dry seasons of 2015 and 2016. The main plot irrigation treatments in both experiments were: flooded, maintaining 10cm standing water through the season and alternate wetting and drying (AWD), a water saving technology developed by the International Rice Research Institute (IRRI) and partners as adaptation strategy for water-scarce environments. In 2015 the split plots were nitrogen (N) applications applied as 0 kg ha-1, 120 kg ha–1, and 150 kg ha–1 total N. In 2016 changes were made to address issues discovered in 2015. In 2016 split plots were N applications at 60 kg ha-1 and 180 kg ha-1 total N. Nitrogen was applied in splits in both seasons.

Disease scoring was the same in both experiments using a sheath blight assessment scale for field evaluation developed at IRRI to assess the severity on infected sheaths and leaves while sheath blight incidence on tillers were counted per hill. Five and four disease assessments were made in 2015 and 2016, respectively. Data were analysed using the area under the disease progress stairs (AUDPS) and multivariate generalised linear mixed models. We were unable to detect any differences in disease in either experiment due to irrigation methods, N rates or the interaction of the two treatments in either season. Our findings indicate that farmers can safely adopt the AWD technology without risk of increasing sheath blight disease.

A/Prof Adam H Sparks leads the summer crop pathology research at USQ in the Centre for Crop Health, previously he worked with the International Rice Research Institute (IRRI) as a plant disease management specialist. Dr Nancy P Castilla works at the International Rice Research Institute (IRRI) as a researcher studying methods to control rice disease and offers training and support for capacity building for national partners. Dr Bjorn Ole Sander works at IRRI as a scientist in IRRI’s climate change research group with a focus on greenhouse gas (GHG) mitigation technologies, which include alternate wetting and drying.