Effects Of Planting Date On Bacterial Panicle Blight Disease Of Rice

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Bacterial panicle blight (BPB) has been a threat for rice production in southern United States in recent years. BPB appears to be a weather-associated disease. Weather conditions in 2010 and 2011 were favorable for the disease to be severe enough to cause devastating yield loss up to 50% in susceptible varieties. Symptoms are not easily detectable at the earlier stage of the crop. Artificial foliage inoculation has been effective with either seed inoculation or foliage inoculation. The foliage inoculation has given adequate infection level when sprayed between boot split and flowering. In natural infection or seed inoculation, panicle symptoms (Picture1) typically develop late in the season. Therefore, predicting disease outbreak is difficult. Occasionally reddish-brown stem discoloration is associated with the disease. However, heavily-infected panicles remain upright due to lack of grain fill with some of the florets showing brownish discoloration at their lower half. Consequently this disease decreases both grain yield and milling quality. To date, there are no chemical options registered in the U.S. to protect or salvage the crop from the disease. Although Jupiter and hybrids are moderately resistant to BPB, most of our non-hybrid commercial varieties are susceptible. Therefore, field studies were initiated in 2012 to examine whether a range of planting dates could be used to manage this disease.

In 2012, artificially inoculated seeds with Burkholderia glumae, the major causal agent, were planted on March 20 as early, April 24 as average, and May 24 as late. Two rice varieties were used: Bengal (susceptible variety) and Jupiter (moderately resistant variety). Treatments were randomized and the experiment replicated four times. Plots across all three planting dates were managed similarly with regards to fertility, water, seeding rate, and herbicide application. To obtain measureable disease data, upright panicles with typical disease symptoms were counted as 100 percent infected but those with symptoms on the lower half the panicle as 50 percent infected. Moreover, yield and milling quality data were collected for all three planting dates. In 2013, regardless of the wet and cold spring that made planting very difficult, the 1st and the 2nd planting were done on March 19th and April 23rd both one day ahead of last year's planting. The 3rd planting was done on May 29th four days after last year's 3rd planting date. All treatments were maintained similar to 2012. Panicles with greater than 50% infection were counted and yield and quality data were also collected.

In both years, the disease level was increasing as you go towards late planting. The bacterial panicle infection was higher in 2012 possibly due to the dry and hot season than 2013 which was wet and cold season. In 2012, nearly 99 percent of the Bengal plots in May planting had bacterial panicle blight as opposed to 2013. In both years, Bengal had higher infection level than Jupiter (Picture 2). Likewise, yield and milling quality were highly affected in May planted plots. A 41% yield loss was calculated for May-planted Bengal and 33% yield loss for Jupiter when compared to the April planting in 2012. In 2013, yield comparisons were difficult to make due to bird feeding damages in both the March April planted plots. Head rice yield were similarly reduced for May-planted plots compared to the earlier planted plots.

Picture 1. Bacterial panicle blight on Jazzman 2 in commercial field in Lee County, 2013

Picture 2: Experimental plots of Jupiter, moderately resistant (left) and Bengal, susceptible (right) to bacterial panicle blight in 2012