

Investigation of rice Bakanae disease in Hualien District: Occurrence, pathogen identification and fungicide resistance assay¹

Yi-Chen Tsai² Jen-Fang Chen³ Yi-Lin Hu⁴

Abstract

Recently, the incidence of Bakanae disease, a seed-borne disease caused by *Fusarium fujikuroi*, is severe at rice seedling and growth stages in Hualien and Yilan areas. To understand the outbreak and distribution of bakanae disease in the field, this study surveyed the occurrence of disease at the seedling and growth stages of rice, determined the seed contamination rate caused by *F. fujikuroi* and the disease incidence at the seedlings stage, conducted the morphological and molecular identification and detection of *F. fujikuroi* by morphology and molecular identification, and performed a fungicide resistance assay. Ninety-three batches of rice seeds were collected from rice nurseries centers in 2012 and 2013. The average percentage of *F. fujikuroi* contamination seeds of various rice varieties were 0%-35.5% by using the semi-selective medium detection. Disease incidence of seedlings was 0-383 plant per plate. The results showed that the incidence rate of Bakanae disease in first cropping season of rice was higher than the second cropping season during rice seedling stage and growing stage in the field in two-year survey. The higher disease incidence was observed on rice varieties Tainan 11 and Taikeng 8. The pathogen contamination rate of seeds and the disease incidence rate reduced after most nurseries replaced the fungicide prochloraz with tebuconazole in 2013. The causal agent of Bakanae disease of rice was identified as *F. fujikuroi* based on morphological and translation elongation factor 1- α (TEF 1- α) sequence. The pathogen was detected by PCR tef-1/tef-2 specific primers, which could be amplified approximately 700 bp DNA fragments, after sequencing was confirmed as *F. fujikuroi*. A total of 101 isolates was selected for the fungicide resistance assay. Most of the isolates were highly sensitive to 2000-fold dilution of Tebuconazole. However, the mycelial growth inhibition rate of the two isolates, HL21 and HL29, were lower than 50% on Tebuconazole. Besides, there were 8 isolates with the mycelial growth inhibition rate between 50%-80% on 1000-fold dilution of Prochloraz, and 1 isolate was lower than 50% on 500-fold dilution of Prochloraz. These results revealed that some isolates of pathogen have showed resistant to Prochloraz and Tebuconazole in the field. For this reason, farmers will be educated to use the recommended fungicides alternately, and do not rely on a single agent excessively to reduce the risk of fungicides resistance.

Key words: rice Bakanae disease, semi-selective medium, rice seed

1. Research article No.264 of Hualien District Agricultural Research and Extension Station.

2. Assistant researcher, Division of Crop Environment, Hualien DARES.

3. Associate researcher, Division of Crop Environment, Hualien DARES.

4. Research assistant, Division of Crop Environment, Hualien DARES.