Development of Genetic and Molecular Tool Boxes to Control Rice Sheath Blight Disease

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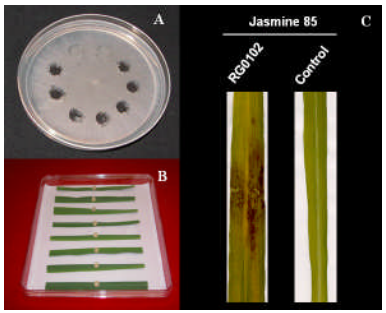
Rice sheath disease has been one of the major constraints for stable rice production in the southern USA and worldwide. The organism causing sheath blight also causes diseases on rotation crops including soybeans and corn. Sheath blight disease has been causing more crop losses since the deployment of semi-dwarf rice cultivars in high intensified rice production systems. In the USA, the use of minor resistance genes with application of fungicides integrated with cultural management have greatly contributed to the effectiveness of sheath blight control.

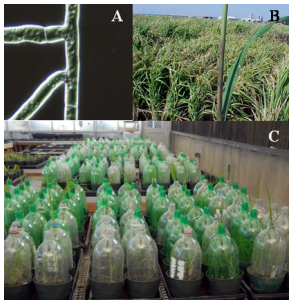
Arkansas farmers spend about $18 million on fungicides annually to control sheath blight disease. In order to develop environmentally benign control methods. We have been identifying the genetic and molecular tool boxes from rice and studying molecular basis of host-pathogen interactions. In the present study, we developed disease evaluation methods, identified molecular markers associated with resistance and created improved resistant germplasm.

Recent Accomplishments

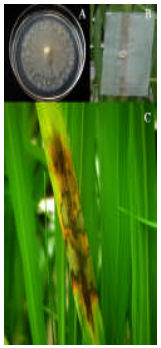
- ✓ Three highly controlled inoculation methods known as detached leaf, micro-chamber and sachet were developed to evaluate sheath blight resistance.
- ✓ A total of 10 sheath blight resistant QTLs were identified on different chromosomal regions with DNA markers.
- ✓ A major resistant QTL was tagged with DNA markers for marker assisted breeding.
- ✓ Five sheath blight resistant germplasm associated with most of the resistant QTLs were developed.
- ✓ A total of 15 putative pathogenicity factors were identified after infections of sheath blight fungus on Jasmine 85, and their expressions in real time have been characterized for better understanding of the mechanisms of host-pathogen interactions.
- ✓ A mapping population of 600 $F_{10\text{-}11}$ recombinant inbred lines were developed.

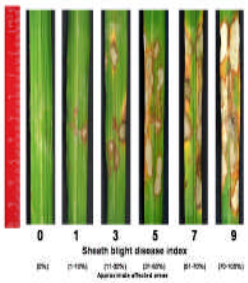


Detached leaf method

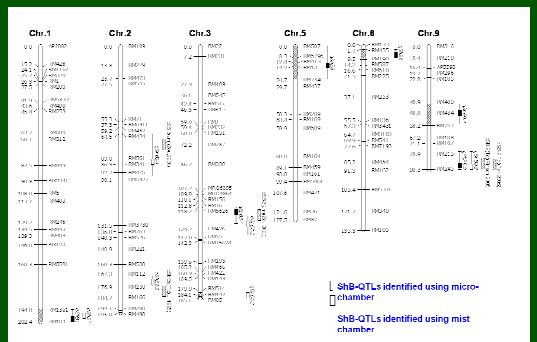


Micro-chamber method





Sachet method



A genetic map with DNA markers

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For more information visit http://ars.usda.gov/spa/dbnrrc/mpp and or http://plantpathology.uark.edu/2245.htm