

Rice Research and Promotion Board
Progress Report Rice Breeding and Genetics Technical Support
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December 2004

- A. Anther Culture: Over 4000 doubled haploid (DH) breeding lines were planted at Stuttgart in 2004. These will be selected for phenotypic acceptability in the field and evaluated for grain quality and disease reaction this winter. One hundred and thirteen DH lines (about 33% of all entries) were included in the Preliminary Yield Trial in 2004. Among the DH lines are medium and long grain entries with excellent grain quality, and disease resistance. Two DH lines were advanced to the ARPT in 2004. Significant progress in anther culture continues to be made. This year we are concentrating on triple crosses combining grain quality and blast resistance using MAS to select individual F1 plants for anther harvest. For this work twenty triple crosses were selected based on previous anther culturability. F2 plants from various single crosses are also being processed through anther culture. Three medium grain crosses that produced DH plants were found to possess tolerance to straight head disorder. DH lines from these crosses are being further evaluated for straight head tolerance and seed multiplied. Also, recovery of DH lines from several recalcitrant parents such as ZHE 733 and Wells has been accomplished. Selection continues on these clones in 2004. Use of these DH derived parents will increase the culturability of crosses derived from these lines.
- B. Molecular Aided Selection: The dominant blast resistance gene *Pi-ta* is at least partly responsible for the blast resistance found in the cultivars “Katy”, “Kaybonnet”, and “Drew”. This resistance has broken down in some fields Arkansas. It does, however, provide resistance to an array of isolates found in the pathogen population. In order to combine *Pi-ta* with *Pi-z* and/or *Pi-B* (genes that provide resistance to the race shift isolate) we can use molecular markers closely linked to these genes coupled with minor or horizontal resistance genes to confer durable blast resistance to Arkansas cultivars. We have evaluated our working germplasm bank for *Pi-ta*, greenhouse blast reaction to field race shift isolates and the RM109 marker for cook type using molecular marker technology; identified parents with the appropriate genes; and are making crosses with these progenitors. Presently, a selected group of F3 lines derived from crosses composed of 1 parent with *Pi-ta* and the other with *Pi-z* are being screened for the presence of the genes. They are being selected in Puerto Rico on the basis of molecular data and will be planted in panicle rows next year. Without the markers we would be unable to do this. We are also routinely using the RM109 marker for cook type. This appears promising for the selection of individual F1 plants of triple crosses for anther culture. Genotyping of F2 crosses between Francis sister lines and Cypress, Drew, and Wells that have shown phenotypic traits of the male parent will begin soon.