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High-throughput gene-based MAS technologies in cereals

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High-throughput gene-based marker technologies for application in marker-assisted selection in breeding programs have been developed for transfer to national program partners. SNP-based markers designed from gene sequences of bacterial blight resistance genes *Xa21* and *xa5* in rice and *Opaque 2 (o2)* gene for quality protein maize were used in combination with these technology platforms to detect the allelic state of these genes, making them a more efficient tool than gel-based assays. We have developed and optimized the dot blot assay as a low-cost technology that can be used without need for sophisticated laboratory facilities while modified fluorescence resonance energy transfer (FRET) assay is a high-throughout technology for use in regional hub laboratories. The dot blot assay is simple yet sensitive enough to detect probe:allele hybrids on nylon membranes. To be cost-effective, we have reduced cost per data point while increasing throughput from 96 to 384 data points per blot. We have likewise extended this technology to detect other traits. For FRET assay, the use of synthetic oligonucleotides as single-stranded DNA template for single base extension ensured the successful occurrence of FRET. We validated this technology in NARES breeding lines and reduced cost in comparison with the recommended procedure. We conducted two workshops in India to validate and transfer these technology platforms for future use in breeding programs by our national program partners.