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Molecular Breeding for Rainfed Lowland Rice in the Mekong Region

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Abstract: In the past 20 years, the rice-breeding program in Thailand had little success in developing new cultivars to replace Kao Dawk Mali 105 (KDML105) and Kao Khor 6 (RD6) for the rainfed lowland rice environments. The main reason for the poor adoption of new cultivars by farmers is the susceptibility to diseases and unacceptable grain qualities. The conventional breeding program also takes at least 15 years from initial crossing to the release of new cultivars. A new breeding strategy can be established to shorten the period for cultivar improvement by using marker-assisted selection (MAS), rapid generations advance (RGA), and early generation testing in multi-locations for grain yield and qualities. Four generation of MAS backcross breeding were conducted to transfer genes and QTL for bacterial blight resistance (BLB), submergence tolerance (SUB), brown plant hopper resistance (BPH) and blast resistance (BL) into KDML105. Selected backcross lines, introgressed with target gene/QTL, were tolerant to SUB and resistant to BLB, BPH and BL. The agronomic performance and grain quality of these lines were as good as or better than KDML105.

Keywords: Grain quality, Marker-assisted selection, Molecular breeding, Rice

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