

Identification and Validation of Co-Dominant Markers for Selection of the CO-4 Anthracnose Disease Resistance Gene in Common Bean Cultivar G2333

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Abstract : Common bean cultivar G2333 which offers broad resistance for anthracnose has been widely used as a source of resistance in breeding for anthracnose resistance. The cultivar is pyramided with three genes namely CO-4, CO-5 and CO-7 and of these three genes, the CO-4 gene has been found to offer the broadest resistance. The main aim of this work was to identify and validate easily assayable PCR based co-dominant molecular markers for selection of the CO-4 gene in segregating populations derived from crosses of G2333 with RWR 1946 and RWR 2075, two commercial Andean cultivars highly susceptible to anthracnose. Marker sequences for the study were obtained by blasting the sequence of the COK-4 gene in the Phaseolus gene database. Primer sequence pairs that were not provided from the Phaseolus gene database were designed by the use of Primer3 software. PCR conditions were optimized and the PCR products were run on 6% HPAGE gel. Results of the polymorphism test indicated that out of 18 identified markers, only two markers namely BM588 and BM211 behaved co-dominantly. Phenotypic evaluation for reaction to anthracnose disease was done by inoculating 21days old seedlings of three parents, F1 and F2 populations with race 7 of Colletotrichum lindemuthianum in the humid chamber. DNA testing of the BM588 marker onto the F2 segregating population of the crosses RWR 1946 x G 2333 and RWR 2075 x G2333 further revealed that the marker BM588 co-segregated with disease resistance with co-dominance of two alleles of 200bp and 400bp, fitting the expected segregation ratio of 1:2:1. The BM588 marker was significantly associated with disease resistance and gave promising results for marker assisted selection of the CO-4 gene in the breeding lines. Activities to validate the BM211 marker are also underway.

Keywords : codominant, Colletotrichum lindemuthianum, MAS, Phaseolus vulgaris

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