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Molecular markers linked to clubroot resistance locus in Chinese cabbage

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Objectives

We tried to elucidate the genetic nature of the resistance against "*P. brassicae* race 4" in Chinese cabbage. Based on this result, we identified molecular markers linked to the resistance locus to establish marker assisted selection (MAS) system in clubroot resistant cultivars breeding.

Materials and Methods

1. Plant Material

Segregating F2 population was obtained by self-pollination of F1 plant derived from crossing resistant inbred line "NCR1" and susceptible inbred line "NRB".

2. Methods:

We identified markers linked to the resistance locus with major effect using DNA fingerprinting technique (RAPD) combined with bulked segregant analysis.

Results and Discussion

Clubroot disease, caused by *Plasmodiophora brassicae*, is one of the most damaging diseases of vegetable *Brassica* crops in the world. The resistance to clubroot in *Brassica rapa* is previously known to be controlled by a major dominant gene and several genes with minor effects on the resistance. To elucidate the genetic nature of the resistance, a segregating F2 population was obtained by crossing resistant inbred line "NCR1", derived from European turnip, with susceptible inbred line "NRB". Distribution of clubroot incidence by "*P. brassicae* race 4" in F2 population did not agree with the segregation pattern of qualitative trait. Bimodal distribution of resistance phenotype in segregating population suggested the presence of one locus with a major effect on resistance. In order to develop clubroot resistant cultivars using marker assisted selection (MAS) system, we tried to identify resistance locus and DNA markers linked to the locus. We identified three markers linked to the resistance locus with major effect using DNA fingerprinting technique combined with bulked segregant analysis. The markers showing low frequency of recombination with the locus in 192 F2 plants were cloned and sequenced. A reliable conversion procedure allowed those RAPD markers to be successfully converted into more useful SCAR markers. These SCAR markers will be used efficiently for development of commercial clubroot resistant cultivars in Chinese cabbage (*Brassica rapa*).

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