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Current Status of *Plasmodiophora brassicae* Researches in Korea

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Clubroot disease is caused by the soil-born obligate plant pathogen *Plasmodiophora brassicae*. This pathogen can infect all cruciferous vegetables and oil crops, including *Brassica rapa*, *B. oleracea*, *B. napus*, and other *Brassica* species. Clubroot disease is now considered to be a major problem in Chinese cabbage production in China, Korea, and Japan. We collected several hundreds of *P. brassicae* infected galls from Korea, and isolated the single spore from the collection. For establishment of novel isolation, and mass-propagation methods for single spore isolates of *P. brassicae* pathogen, we developed new filtration method using both cellulose nitrate filter and syringe filter. Accurate detection of *P. brassicae* pathogen in the field was done by using real-time PCR in the potential infested soil. When we tested the different pathogenicity on commercial Chinese cabbage varieties, *P. brassicae* from collected galls showed various morphological patterns about clubroot symptom on roots. To date, 8 CR loci have been identified in the *B. rapa* genome using the quantitative trait loci (QTL) mapping approach, with different resistant sources and isolates. We are trying to develop the molecular marker systems for detect all 8 CR resistant genes. Especially for the study on the interaction between pathogens and CR loci which are not well understood until now, genome wide association studies are doing using the sequenced inbred lines of Chinese cabbage to detect the novel CR genes.