Plant Pathology Seminar Series

Characterizing Sources of Genetic Resistance in Chickpea to Pre-emergence Damping-off Disease Caused by Metalaxyl Resistant *Pythium ultimum*

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Abstract

Seed rot and seed damping-off disease caused by *Pythium ultimum* is an important disease of chickpea in the Pacific Northwest, U.S., and other regions of the world. The disease is managed principally by the application of fungicides such as metalaxyl. However, reliance on metalaxyl has caused an increase in resistance in multiple *P. ultimum* populations. The sources of resistance to metalaxyl-resistant *P. ultimum* were identified using 39-accessions of a 'mini-core' collection from the U.S.A. National Plant Germplasm System (NPGS) and 209-accessions of a mini-core collection developed by International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Resistance was evaluated based on the emergence of chickpea seedlings from soil artificially infested with the pathogen. The study identified higher resistance in *Desi* accessions as compared to *Kabuli* accessions. Based on the consistent resistant reactions to *P. ultimum* and higher 100-seed weight, *Kabuli* accession PI360189, PI450911, W6 25882 and W6 25884, may be used as parental materials for improving *Kabuli* cultivars. To identify genomic regions for *Pythium* disease resistance, a panel of 209 mini-core collections of chickpea accessions obtained from ICRISAT and 177 chickpea recombinant inbred lines derived from a set of an interspecific cross between *C. reticulatum x C. arietinum* (CRIL-7: PI 599072 x FLIP 84-92C)] were used. Overall, two QTLs, "q4-1" on LG4 with 41.8 % of the phenotypic variation, "q8-1" on LG8 with 4.5% of the variance and seven candidate genes were detected using QTL mapping. In addition, nine significant SNPs and seven candidate genes were detected by genome-wide association studies. Using marker-assisted breeding, the QTLs and candidate genes identified in this study could be incorporated into chickpea breeding programs to improve resistance to seed rot and pre-emergence damping-off caused by metalaxyl-resistant *P. ultimum*.

References

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