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Project Title: Association Mapping DNA Markers to Leaf Spot Resistance in Cultivated Peanuts that can be used in Breeding Program (PID 388)

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2015 ~~Progress Report~~ Final Report + Summary

The ongoing genome sequencing effort in peanut will result in numerous molecular markers that can be applied to mine valuable genes for peanut cultivar improvement. Association mapping based on linkage disequilibrium (LD) provides a more effective way to map trait loci since ancestral recombination events that occurred in natural populations present a potentially large number of alleles per locus to associate markers and traits. In-depth phenotyping of the diverse collection is likely to identify markers that can be employed by breeding programs to enrich the marker-traits detection. A diverse collection of 135 lines including mini-core, cultivars and advanced breeding lines was evaluated for leaf spot and TSWV in field plots for three years. A set of 192 SSR primers from peanut genetic linkage maps were utilized to genotype the population. Three markers named 'pPGPseq2D12B', 'pPGSseq19B1', and 'TC04F12', were confirmed to be associated with leaf spot and TSWV resistances. The marker 'TC20B05' can explain 15% phenotypical variation of leaf spot resistance. These markers could be applied in marker-assisted selection (MAS) for peanut cultivar improvement.

Publications:

Liu, L. P. Dang, and C.Y. Chen*. 2015. Development and utilization of InDel markers to identify peanut (Arachis hypogaea) disease resistance. Frontiers in Plant Science. 6:988. doi: 10.3389/fpls.2015.00988.

Meng, S., X. Yang, P.M. Dang, S. Cui, G. Mu, L. Liu, and C.Y Chen*. 2016. Evaluation of genetic diversity with Insertion-Deletion marker and marker-trait association analysis in cultivated peanut (Arachis hypogaea L.). Genetics and Molecular Research. Doi: http://dx.doi.org/10.4238/gmr.15028207.

Presentations at International Meeting:

Tang, Y.Y., C.Y. Chen, P.M. Dang; A. Hagan, K. Bowen, and G. He. 2015. Association mapping of SSR markers to leaf spot and TSWV resistances in cultivated peanut. 2015. The 8th International Conference of the Peanut Research Community on Advances in Arachis through Genomics and Biotechnology (AAGB) in Brisbane, Australia, – Nov. 5-7, 2015.

Other presentations

Dang, P.M., M.C. Lamb, K.L. Bowen, and C.Y. Chen. 2016. Analysis of Disease resistance gene analogs (RGAs) gene expression to associate leaf spot resistance in cultivated peanut. 2016 American Peanut Research and Education Society Proceedings. 11-15 July 2016. Clearwater, FL.