

Determining the impacts of acylsugar characteristics on whitefly response

Brian Leckie, Darlene DeJong, and Martha Mutschler, Dept. of Plant Breeding and Genetics, Cornell University, Ithaca, NY bml66@cornell.edu

The Cornell tomato breeding program has developed acylsugar-mediated insect resistant tomato lines capable of controlling virus vectoring insects. The current benchmark acylsugar breeding line, CU071026, contains 4 *Solanum pennellii* LA716 introgressions on chromosomes 2, 3, 7, and 10, and produces modest levels of acylsucroses (~15 $\mu\text{mol/g}$ dry leaf tissue) with a fatty acid profile predominated by i-C5, n-C12, and i-C4 fatty acids. The efficacy of the acylsugar insect resistance tomato breeding lines may be improved by adding *S. pennellii* regions containing additional acylsugar QTL. Additional putative QTL affecting level or chemotype of acylsugars were identified by analysis of a BC₁F₁ population produced by crossing the F₁ CU071026 x *S. pennellii* LA716 with CU071026 as the recurrent parent. Tests of tomato breeding lines with and without these putative QTL are proceeding to inform the breeding program on the optimal levels and/or chemotype/s of acylsugars for the most effective insect control. The first tests focus on QTL affecting acylsugar level. To determine the adequate level of acylsugar production required, two independently derived sets of related acylsugar tomato lines producing similar acylsugar chemotypes but varying in levels of total acylsugar production were tested in field cages infested with silverleaf whitefly, *Bemisia argentifolii*. Evaluation of acylsugar chemotypes with varying sugar moieties or fatty acid profiles is being performed using purified acylsugar extracts from multiple *S. pennellii* accessions. The spray tests with these *S. pennellii* extracts will be performed on multiple insects. The results from these insect assays will determine which QTL should be introgressed into the current breeding lines for acylsugar optimization. Breeding materials are currently being generated to verify putative QTL for modifications to acylsugar chemotypes and for rapid incorporation into the current lines.