M-01

Prospects for improving the ozone tolerance of soybean

*Kent Burkey**, Plant Science Research Unit, USDA-ARS, North Carolina, USA
Thomas Carter, Soybean & Nitrogen Fixation Unit, USDA-ARS, North Carolina, USA
Amy Burton, Plant Science Research Unit, USDA-ARS, North Carolina, USA

Modelling studies suggest that current ground-level ozone concentrations reduce soybean yield by 10-20%. In the absence of successful international efforts to reduce air pollution, continued genetic improvement of soybean will require breeding for enhanced ozone tolerance to sustain and/or increase soybean yields to overcome this component of environmental stress. Soybean germplasm was screened for ozone stress response by assessing foliar injury following short-term ozone exposures in greenhouse chambers. This differential foliar injury was found to be associated with yield loss under season-long elevated ozone treatment in open-top field chambers. From these screening studies, ozone-tolerant Fiskeby III [PI 438471, maturity group 00] and ozone-sensitive Mandarin (Ottawa) [PI 548379, maturity group 0] were selected as parents to develop a mapping population. A set of 240 recombinant inbred lines (RILs) were used to identify quantitative trait loci (QTLs) for ozone response. Plants were exposed to ozone in greenhouse chambers and each main stem leaf individually scored for foliar symptoms. QTLs for ozone response were identified on chromosomes 1, 4, 6, 17, 18, 19, and 20. Different QTLs were associated with distinct leaf developmental stages suggesting that ozone tolerance is a complicated trait involving more than one mechanism. The markers associated with these QTLs are potential tools to assist in the process of moving ozone tolerance genes from Fiskeby III into elite germplasm. On-going studies of the germplasm developed in Fiskeby, Sweden showed Fiskeby III to be the most ozone tolerant with other lines such as Fiskeby 840-7-3 [PI 438477, maturity group 00] being as sensitive as the Mandarin (Ottawa) parent. Thus, selecting the correct Fiskeby line as the source of ozone tolerance genes is critical.