

## Soybean Aphid Resistance

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Since its arrival from Asia in 2000, the soybean aphid has spread throughout Illinois and into other parts of North America. In 2003, there was an estimated loss in Illinois of \$45 million due to the soybean aphid, despite one million acres being treated with insecticides. Although aphid populations were low in 2004, suction trap counts during fall of 2004 suggested that populations would likely rebound in 2005. Populations did rebound to an average of over 100 aphids per plant by mid-June, 2005 in northern Illinois and several other states and Canada. Presently, the only means that growers have to control the soybean aphid is the application of chemical insecticides. Plant resistance is the most cost effective and environmentally safe way to control the soybean aphid. The cultivar Dowling and several other soybean genotypes with high levels of aphid resistance were identified at the University of Illinois after screening over 3,000 plant introductions from the USDA soybean germplasm collection. Dowling is an old Maturity Group VIII cultivar, which expressed strong antibiosis towards soybean aphids in greenhouse tests. Antibiosis means that aphid populations did not develop when forced to feed on it, resulting in limited aphid colonization. In field experiments, plants with the Dowling resistance performed as well without treatment as those treated with a systemic insecticide. Genetic studies recently completed at the University of Illinois have shown that a single dominant major gene controls aphid resistance in Dowling. The location of this gene has been mapped onto the soybean genetic map. Linkage between the gene and DNA markers is allowing us to quickly develop aphid resistant cultivars using marker-assisted selection techniques and to study the effects of this gene on resistance and agronomic traits. Using genetic markers, we developed Illinois adapted experimental lines with the Dowling resistance in one year. These lines are being tested in several locations in Illinois and in other North Central states this season. Aphid resistant lines we developed and the information on the marker association with resistance is being licensed to several seed companies and these companies are now developing aphid resistant varieties. Additional sources of aphid resistance found in the soybean germplasm bank are under study and these could contribute new resistance genes in addition to the Dowling resistance, which could help protect the soybean crop far into the future.