Progress from Selection in Alfalfa Breeding for Resistance to the Root Feeding Pest Clover Root Curculio

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The clover root curculio (CRC), *Sitona hispidulus* F., is a weevil pest of alfalfa, *Medicago sativa* L., throughout most of North America. Larval feeding on nodules and roots has been shown to decrease yield and persistence in alfalfa stands as well as to provide an entry for root diseases. The evaluation of plant introductions by Presho (1975) showed significant variation in CRC resistance among lines, and Byers et al. (1996) found that progeny of plant introductions selected for resistance also had significantly less CRC feeding damage. No additional breeding for resistance has been reported nor are any CRC resistant cultivars being marketed.

The Cornell Forage Breeding Program has gone through four cycles of field selection in several alfalfa populations for plants that are free from root feeding damage after three years in the field. In Cornell alfalfa breeding lines, significant genetic variability for resistance to clover root curculio was discovered in field selections. The standard unit heritability regressing full-sib progeny means on their mid-parent means was 0.59±0.25 (Neally et al., 2006). After additional cycles of selection, a field evaluation of breeding progress for clover root curculio was completed in 2016. The alfalfa populations evaluated were derived from ‘Oneida Ultra’ and ‘Seedway 9558’ and were selected for field resistance for three cycles. These selected populations were compared to the original populations and also to populations that had been selected for susceptibility to clover root curculio for one cycle in a divergent selection program. Over the two alfalfa cultivars, the cycle 3 resistant selections averaged 42% resistance, the original unselected cultivars averaged 18% and the susceptible selections averaged 6% resistance. Additionally a population named ‘Curculio crosses – cycle 2’ had 56% resistance to clover root curculio, but this percentage was not statistically greater than the other resistant populations, based on the least significant difference at 95% confidence. From this field evaluation, selection for resistance to clover root curculio in alfalfa has been successful.

Reference

Byers, R.A., W.A. Kendall, R.N. Peaden, and D.R. Viands. 1996. Field and laboratory selection of *Medicago* plant introductions for resistance to the clover root curculio (Coleoptera: Curculionidae). J. Econ. Entomol. 89:1033-1039.

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