A Precise Position for the Soybean Protein/Oil QTL on Linkage Group I. (C07-specht205830-Oral)

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Abstract:

Several QTL mapping studies have been conducted using matings of a high-protein (48%) low-yield parent with a high-yield parent of ordinary protein (42%). A QTL with a major effect on protein/oil/yield has been repeatedly detected on LG-I, and we recently mapped it to a small genomic segment (0.84cM) flanked by Satt700/496 and Satt239. In populations segregating for the parental alleles at this QTL, regression of protein and oil on yield revealed respective coefficients of -2.6 and +1.6 percentage points per kg/ha (i.e., a protein / oil exchange ratio of -1.6). The additive effect of the high protein parental allele on seed protein and oil was a respective +1.0 and -0.6 percentage points (a protein / oil ratio of -1.6), and its effect on yield was -154 kg/ha. Given a genic-based protein / oil exchange ratio of 1.6, and a calorific-based oil / protein ratio of 2.0, 0.4 units of carbon and/or energy should be available for (other) seed dry matter. However, both oil and yield invariably fall when seed protein is genetically enhanced, suggesting that protein synthesis and its deposition in the seed are energetically more costly to the plant than physiologists have commonly assumed.

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