Detection and Validation of Agronomic and Seed Quality Quantitative Trait Loci in Soybean

A Thesis Presented for the Master of Science Degree
The University of Tennessee, Knoxville

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Abstract

Soybean seed quality and agronomic traits are important commercially. Agronomic traits such as yield, plant height, lodging, and adapted maturity have been the primary focus of breeders for many years. Seed quality traits are also important as they affect the market price of soybean. Higher protein soybean historically is valued more per unit. It is the goal of plant breeders therefore to simultaneously improve seed quality and agronomic traits. Seed quality and agronomic traits are quantitative traits whose inheritance is governed by many genes, and whose expression is subject to environmental variation. Furthermore, negative correlations between yield and protein, and protein and oil make it even more difficult to select for these traits. Molecular breeding tools such as quantitative trait loci (QTL) can provide breeders with a more direct method of selection for traits at the molecular level. QTL can however be misleading as they are subject to type I and type II errors. QTL validation studies are essential to marker assisted programs as they negate the need for individual breeders to validate every QTL of interest. The purpose of this study was to validate previously reported seed quality and agronomic trait QTL in an independent population derived from an Essex x Williams 82 cross. We were able to validate QTL for all traits and detected novel QTL that may be useful to breeders.

To the Graduate Council:

I am submitting herewith a thesis written by Catherine Nyaguthii Nyinyi entitled "Detection and Validation of Agronomic and Seed Quality Quantitative Trait Loci in Soybean." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant Sciences.

Vincent R. Pantalone
Major Professor

We have read this thesis
and recommend its acceptance:

Fred L. Allen

Dean A. Kopsell

Carl E. Sams

Accepted for the Council:

Carolyn R. Hodges,
Vice Provost and
Dean of the Graduate School

(Original signatures are on file with official student record.)

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