Murray Moss

Biological Engineering
Year in School: Junior
Hometown: Springfield, Mo.
Faculty Mentor: Dr. Georgia Davis, Plant Sciences
Funding Source: NSF Undergraduate Mentoring in Environmental Biology

Traits associated with brace root characters implicate light and hormonal signaling pathways

Murray A. Moss, Michael J. Gerau, & Georgia L. Davis

Maize brace roots provide the plant with access to water and nutrients in the soil, increase stability, and improve lodging resistance. The goal of this study is to connect brace root traits to traits linked to developmental and hormonal pathways, and light perception by multiple regression and correlation analysis. Two replications of twenty-seven diverse lines of maize were planted and measured for light perception traits, maturity and phase transition traits, in the summer of 2007. Forward selection and backwards elimination multiple regression and correlation analysis were performed in SAS. A significance threshold of 0.05 for entry or elimination was used in the multiple regression analysis. Model R-squared values had a range of 0.47 to 0.64. The variables significant for the number of nodes with brace roots and the number of brace roots at node one were related to the growth hormone gibberellic acid (GA) such as average internode length and juvenile and transition leaf number. Soil node diameter and ear height were also linked to root traits and are under the genetic control of the light response regulators phytochromes B1 and B2. A proposed model showing how GA and light perception affect plant development is reported. This research was funded by the Undergraduate Mentoring in Environmental Biology and The Life Science Mission Enhancement programs.