Public Abstract
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Title:PATHWAY APPROACHES TO DISSECTING THE INHERITANCE OF MAIZE (ZEA MAYS L.) SHOOT-BORNE ROOTS

The root system is a necessary part of the plant that delivers water and nutrients for plant growth, development and reproduction. To further understand how root shoot-borne root systems develop two developmental pathway-based studies were conducted. First, family-based genetic mapping identified chromosome regions affecting shoot-borne root patterning. The regions were then searched for genes that may be involved in shoot-borne patterning. Two genes were positioned inside chromosome regions controlling shoot-borne root patterning. These two genes, dward3 and Dwarf8, are involved in the production and response to the phytohormone, gibberellic acid. Using a population-based mapping study, mutations within these two genes were found to impact shoot-borne root development. These results confirmed previous findings that implicated gibberellic acid in shoot-borne root development. A second pathway-based approached was conducted on a set of agronomic trait values collected from a diverse set of maize lines. A multivariate statistical analysis was conducted on the trait data call principle component regression. This procedure detects hidden patterns of trait correlation and was used to identify a light-signaling pathway which impacts shoot-borne root development. Further support for the involvement of light-signaling was provided by mutant phenotyping and field experiments which confirmed the predictions of the multivariate analysis. The two pathways were integrated into one model where light-mediated redistribution of gibberellic acid dictates shoot-borne root patterning.