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Auxin and brassinosteroid interdependent regulation of stomatal development in maize

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Zea mays (maize) contains pores in the epidermis known as stomates that are important for regulating gas exchange for photosynthesis. Maize, a C4 photosynthetic plant, thrives in warm temperatures by continuing photosynthesis via a spatial separated carbon mechanism within the bundle sheath cells with reduced stomatal aperture. Auxin (IAA) and brassinosteroids (BR) are hormones for growth and development, shown to inhibit the development of stomates in Arabidopsis. The *brassinosteriod deficant1 (brd1)* mutant is a serve dwarf with low concentrations of BR. The *brd1* mutant is a BR C-6 oxidase, which functions in the final step of BR synthesis. BR regulates stomatal development through the Mitogen Activated Protein Kinase (MAPK) pathway. The *vanishing tassel2 (vt2)* mutant contains low levels of IAA, exhibiting reduced height, reduced number of leaves, and altered inflorescence development. The *vt2* mutant is a co-ortholog of tryptophan aminotransferase (TAA1) in Arabidopsis. The *vt2* mutant exhibits a decreased stomatal index and density on the abaxial side of the leaf compared to the wild-type plants. The stomatal index also was decreased on the adaxial side of the leaf, although the density was higher compared to the wild-type siblings. The *brd1* mutant displayed a decreased stomatal index and an increased stomatal density on both sides of the leaf compared to the wild type. The double mutant displayed a slightly higher index and significantly higher density on the abaxial epidermis of the leaf. Stomatal index and density were higher on the adaxial side of the leaf in *brd1* mutants than in the wild type. A study to determine the cellular effects of BR reduction on IAA polar transport, and the effects of lowered IAA on BR signaling in developing stomata is in progress to further understand the initiation and development of stomata in maize.