

## **Biomass partitioning in corn as affected by weed-induced reduction in red-to-far-red light during the critical period of weed control**

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Weed interference is the greatest factor contributing to yield loss in corn (*Zea mays* L.). Corn is most vulnerable to weeds from the third to tenth leaf tip developmental stages. Corn yield loss in excess of 5% is possible even when weeds are removed at an early developmental stage such as the fourth leaf tip. Currently, it is not understood how young weeds influence early corn growth because at this stage the weeds do not shade the corn and so there is no direct competition for resources. Researchers believe that plants have adapted to anticipate competition for light by perceiving changes in the light spectrum prior to shading. Preliminary research suggests that light reflected from young weeds may trigger developmental responses in corn that continue to have effects later in the corn's life cycle. This research investigates the effect of reduced red-to-far-red light (R:FR) on dry matter partitioning in corn, and specifically whether early weeds influence how corn partitions dry matter and whether this influences how corn responds to late season stress. A 2-year field study was conducted in a hydroponic system with the corn hybrid Pioneer 3902 and redroot pigweed (*Amaranthus retroflexus* L.) plants, which were used to establish specific periods of low R:FR: 1) weed-free check; 2) removal at four leaf tips; 3) removal at six leaf tips; 4) removal at eight leaf tips; 5) removal at ten leaf tips; and 6) always weedy. In the second year of the field study, the grain yield of non-weedy and weedy corn that was exposed to water stress will be compared to unstressed corn by imposing four treatments: 1) non-weedy and no water stress check; 2) non-weedy and water-stressed; 3) weedy and no water stress; and 4) weedy and water-stressed. In 2003, root : shoot biomass at silking decreased 27% in corn with weeds present until the tenth leaf tip compared to non-weedy corn. In 2004, root : shoot biomass at 8 leaf tips was 15% less in weedy corn compared to non-weedy corn. Thus far, our data suggest that early weeds have lasting effects on corn, shifting biomass partitioning from the roots to the shoots. Such a shift could predispose corn to water and nutrient deficiencies later in the growing season, causing significant yield loss.