

Ryan Dierking, Plant Science

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Determination of ABA Concentration in Three Stages of Development Among Inbred lines Mo17, Fr697, B73, and B97

Throughout the US, millions of bushels of corn are lost due to the damaging effects of drought each year. One of the responses to drought in maize is the production of abscisic acid (ABA). ABA is involved in reducing water loss by triggering stomatal closure, along with modulating growth of roots and shoot tissues. Root architecture is a critical factor in the absorption of water and the overall maintenance of water relations in the plant. In this study, inbred lines Mo17, Fr697, B73, and B97 were evaluated. Roots of dark-grown Fr697 seedlings continue to elongate under severe water stress while those of B97 fail to elongate. Similarly grown Mo17 and B73 seedlings have intermediate root responses in comparison. In this experiment, three stages of growth (seedlings, whorl-stage, and silking maize plants) were evaluated in the growth chamber for several root architecture traits under well-watered (ww) and water-stressed (ws) conditions, and ABA concentrations were measured in the 1-15mm root tip region and midsection of leaf tissue. Measured characteristics included root length, root mass, root branching, seminal root number, brace root number, brace root mass, shoot mass, water potential (ψ_w), and number of leaves present at harvest. Soil moisture was also measured. Each plant was measured only once due to the destructive nature in which the measurements are taken. Four replicated measurements were performed daily for five days for each line during the harvest period in ww and ws condition. The ws was induced by adding a polyacrylamide water retainer (Terra-Sorb™) that allowed a slow release of water into the soil to prevent immediate desiccation, allowing for a longer response time which more closely mimics field drought conditions. Under low water potentials maize seedling exhibit root expansion and shoot growth inhibition with the accumulation of ABA (Sharp RE, *et. al.*, 1988, Westgate ME, and Boyer JS, 1985). Observations made during harvest of silk stage plants show that Fr697 has a deep and fibrous root system and reaching wilting more slowly than the other inbreds tested, while Mo17 has a completely fibrous root system that is very dense in the first 5cm from the soil surface. B73 exhibits wilting early and has a less fibrous root system, as does B97.