3107 - Crop Physiology and metabolism

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ROOT TRAITS ANALYSIS OF RECOMBINANT INBRED LINES TO IMPROVE PHOSPHORUS ACQUISITION EFFICIENCY IN MAIZE

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Phosphorus (P) is essential macronutrient for plants, which is acquired from the rhizosphere solution as phosphate (Pi), primarily in the form of H2PO-4. The concentration of Pi in the soil solution is often low, therefore the supply of Pi to the root surface by diffusion is slow. Hence, P is one of the least available mineral elements in the soil and frequently limits plant growth. Crop production always requires P fertilizers to maintain yield and quality. An alternative to ameliorate this problem is to explore the genetic diversity available in plants and breed more Pi-absorption efficient cultivars in combination with soil management practices. This study aimed to analyze maize root traits that could be involved in P acquisition efficiency. We used a paper pouch system with Magnavaca´;s nutrient solution (low P - 2.5 ?M) under a controlled environment to evaluate four root traits (length, volume, diameter and volume of fine roots) in a population of 145 recombinant inbred lines (RILs) derived from a cross between maize genotypes L3 and L22, which have contrasting adaptation to low P availability in the field. High heritability (79.1 to 86.1%) and low coefficient of variation (7.1 to 22%) were detected for the root traits. Additionally, Principal Component Analysis (PCA) enabled us to differentiate contrasting maize RILs based on the selected root morphology traits. The first principal component (PC1) explained 66.2% of the variation while the second principal component (PC2) explained 31.2%. PC1 had positive eigenvector coefficients for all variables, except for root diameter. PC1 was explained most by root volume and PC2 was explained mostly by root diameter, allowing identification of the lines with contrasting root system traits. These phenotypic results will be used in the discovery of root morphology QTLs that are also involved on P acquisition efficiency in maize.