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ROOT MORPHOLOGICAL ANALYSIS OF A MAIZE DIVERSITY PANEL

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The modular structure of roots enables them to quickly respond to their surrounding environment, making plants more adaptable to environmental changes, such as water availability and nutrient supply. Certain root system types can help increase the yield due to their higher capacity to acquire nutrients and water. Our work aimed to study root morphological traits of a maize diversity panel, composed of two hundred inbred lines from Embrapa Maize and Sorghum breeding program. The panel was analyzed in a completely randomized experimental design with three biological replicates. Maize seeds were surface sterilized with sodium hypochlorite and germinated in moistened paper rolls. After four days, uniform seedlings were transferred to moistened paper pouches and kept in Magnavaca's solution under controlled conditions. Nutrient solution was changed every three days and the pH was maintained at pH 5.6. In order to analyze and quantify root traits, roots were photographed after 13 days, and the images were processed and analyzed using WhinRhizo software. Four root traits were quantified: length, volume, diameter and volume of fine roots (1-2 mm). Low coefficient of variation, 25.3, 20.2, 7.2 and 24.5% and high heritability 78.2, 79.7, 77.6 and 79.2% were detected for length, volume, diameter and volume of fine roots, respectively. Principal Component Analysis (PCA) was applied, enabling differentiation of genotypes based on the selected root morphology traits. PC1 explained 64.6% and PC2 33.09% of variation of the maize lines. PC1 had positive eigenvector coefficients for all variables, except for root diameter, and was explained mostly by length and volume. PC2 had a negative eigenvector coefficient for length and was explained mostly by root diameter. The information generated by this study will be useful for establishing early selection strategies for selecting maize plants more efficient in water and nutrient acquisition. Supported by Embrapa, CNPq, Fapemig and Generation Challenge Program (GCP).