



**Concentration Area:** Plant breeding

## **Root architecture traits as a mechanism of adaptation to water deficit conditions in popcorn**

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Obtaining genotypes of popcorn adapted to the water deficit is essential, due to the strong impacts of this stress on its development. A 'steep, cheap, and deep' root ideotype can improve the efficiency of genotypes in water capture in water-limited environments. This work aimed to investigate genotypic differences of agronomic and root traits in popcorn in contrasting water conditions. A total of 10 lines and 15 hybrids from crossings in circulating diallel scheme, with  $s = 3$ , were evaluated under conditions of well-watered (WW) and water-stress (WS). The experiments were conducted in randomized complete blocks, with three replications. Water stress was imposed ten days before male pre-flowering and remained until the end of the crop cycle. Individual analyses of variance and genotypic correlation were performed. In WS and WW, all the traits showed statistical differences between genotypes, showing the existence of variability. Comparing WS and WW, the root angle increased by 4.92 % in the support (ALR) and 4.05 % in the crown (ACR), while the number of roots was reduced by 6.49 % in the support (NLR) and 9.99 % in the crown (NCR). The density of the roots decreased 12.24 % in the support (DLR) and 14.23 % in the crown (DCR). Reductions in grain yield (GY) and popping expansion (PE) were 39.42 % and 9.74 % respectively. Increasing the angle of roots in relation to the soil improves the acquisition of water and nutrients, while a lower number and density improves the metabolic efficiency of soil exploration under stress conditions. For WS there was a significant negative correlation for  $GY \times NCR$  (-0.70) in inbred lines and positive for  $GY \times ACR$  (0.82) in hybrids. Reducing roots and larger angles of roots are adaptive mechanisms that can provide indirect gains in GY in WS.

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