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Program and Abstracts

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P305

Resistance to barley yellow dwarf virus in segregating populations of maize

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With increasing winter temperatures in Germany, barley yellow dwarf virus (BYDV) is expected to become a prominent problem in maize cultivation. Breeding for resistance is the best alternative to control the disease and break the life cycle of the virus. The objectives of our study were (I) to determine phenotypic and genotypic variation in five segregating populations of maize with respect to BVDV tolerance and resistance and (II) to quantify the influence of BYDV infection on plant performance traits. In 2011, five segregating populations with a total of 445 genotypes were grown at two locations in Germany as well as in greenhouse experiments. Plants were inoculated with the virus BYDV-PAV transmitted by aphids of the species *Rhopalusiphum padi*. We observed considerable genotypic variance for the traits virus content as measured by ELISA as well as symptom occurrence. Furthermore, heritabilities were high for the plant performance traits, ear height and plant height. Correlation coefficients between the pairs of traits were significantly different from 0 (α=0.05) but low. Inoculated plants were reduced in plant height compared to not inoculated plants. The results of our study suggested a high potential for breeding of BVDY resistant maize.

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Root morphological analysis of a maize diversity panel under low and high phosphorus

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Phosphorus (P) is an essential macronutrient for plants, which is acquired from the rhizosphere solution as phosphate (Pi). 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. The modular structure of roots enables them to quickly respond to their surrounding environment, making plants more adaptable to environmental changes. Certain root system types can help increase the yield due to their higher capacity to acquire Pi. Our work aimed to explore the diversity of root morphology related with P acquisition efficiency. We used a paper pouch system with Magnavaca´s nutrient solution (2.5 and 250 uM P) under a controlled environment. We evaluated four root traits (length, volume, diameter and volume of fine roots), dry weight and P content of a maize diversity panel, composed of two hundred inbred lines from Embrapa Maize and Sorghum breeding program. Low coefficient of variation and high heritability were detected for all analyzed traits. Significant differences for genotypes and P dose were detected for all traits. The interaction between genotype and P was significant for all traits except, root average diameter, total dry weight and shoot dry weight. A correlation among root traits and dry weight was observed in both low and high P conditions. Frequency distribution and Principal Component Analysis enabled us to observe a great diversity of root system types within the population in both conditions. Genotypic variation for root system has been associated with substantial variation in the acquisition of P. The utilization of root traits in crop breeding program would be greatly facilitated by a better understanding of the genetic, physiological and environmental regulation of root system elements.

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