



Visions for a Sustainable Planet

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110-4 Genetic Variation for Root Size In Tetraploid and Hexaploid Wheats.

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Wheat root characters have not been selected directly by humans since domestication up to 10,000 years ago. Root size of some modern cultivars may be too small for maximum grain yield, even under irrigation, but especially under drought. Root and shoot sizes are inherited independently. Root size positively affects water-nutrient uptake, photosynthesis and grain yield. We surveyed 17 spring landrace and modern cultivars of tetraploid (7) and hexaploid (10) wheat for root biomass and shoot traits over 2 years in sand-cultures. Single plants were grown in 6.5 kg sand in plastic pots. Traits were recorded at phenological stages or at grain maturity in 2009 and 2010. There were 4 replications in a randomized complete block design. The magnitude of G X E interaction was relatively small, so mean values averaged over years are reported. Mean root biomass at maturity for tetraploids ranged between 4.8 g Indian Jammu to 16.8 g Blue Beard; and for hexaploids between 3.0 g for Cal Rojo and 15.1 g Spanish Spelt; a 3.5- and 5.0-fold difference, respectively. Modern cultivars had root biomass values in the lower half of the range. Mean grain yield per plant ranged from 8.2 g for tetraploid Blue Beard to 27 g for hexaploid Sonora. Mean Harvest Index ranged from 9.7 Blue Beard to 38.6 Desert King for tetraploids and from 8.9 Spanish Spelt to 43.9 Cal Rojo. There is large genetic variation for root and shoot traits within tetraploid and hexaploid wheat that may be used to improve root traits in breeding.

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