

Root development in grain sorghum hybrids

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The profuse root development in sorghum is considered one reason for its drought resistance. Sorghum genotypes differ in their rooting pattern (1,2), but only a few genotypes were examined under limited growing conditions in these studies. In our work a range of hybrids were grown under different growing conditions to investigate genotypic variability in root development.

Methods

Trials were conducted over the following range of sites/water stress treatments: Gatton 1981 - late crop with cool temperatures during grainfilling; Norwin 1982 - dryland with water deficits developing after flowering, and irrigated; Gatton 1983 - early crop; Gatton rain shelter 1 - stressed after flowering; and rainout shelter 2 - stressed before flowering. More than 10 hybrids were used in each site except under the rainshelter. Cores of soil samples were taken at maturity and root length was determined by the line intersection method.

Results and Discussion

Genotypic variation in total root length was evident at all sites (Table 1).

Table 1. Variation in total root length for a number of hybrids grown under a range of moisture stress conditions (D - dryland, I - irrigated, R.S. - rainshelter).

Hybrid	Root length (km/m ²)					
	Gatton 1981 (1.2 m depth)	Norwin (1.4 m)		Gatton 1983 (1.7 m)		
	D	D	I	D	R.S.1	R.S.2
Dorado	10.74	24.18	17.67	16.8	20.5	14.5
E57	13.47	21.94	18.93	23.5	16.7	23.2
Goldrush	14.10	21.57	11.83	22.5		
Pride	8.76	15.43	14.67	10.7	11.5	11.9
Tx610SR	13.51	23.15	13.59	16.3		
Yates 212	8.87	17.25	10.55	14.9		
Gem	8.45	15.95	12.60	13.6		
LSD (P=0.05)	4.2	5.7	6.5	3.2	N.S.	7.8

Hybrids E57, Goldrush, Tx610 SR and Dorado had high root lengths at most sites while Gem, Pride and Yates 212 were consistently low. The late sown crop at Gatton 1981 had low root lengths while soil water deficits at Norwin-D and Gatton R.S. 1983 did not result in reduction in root length. The difference in root length at different sites was relatively small considering large variation in growth environment and grain yield (mean site yield 8.1-2.2 t ha).

These results are evidence of genetic control of root development and that this character is relatively stable under different growth conditions.

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