Differential performance of diverse sorghum hybrids over a wide range of environments

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Hybrids of temperate and tropical background were compared under both dryland and irrigated conditions in environments ranging from temperate (Gunnedah) to tropical (Kununurra). In this paper we examine and quantify the grain yield responses of four hybrids which were grown in each of 18 environments.

Methods

Four sorghum hybr$_i$ds, replicated three times, were grown at a plant density of 5.0 m in 1 m rows in each of 18 environments with adequate nutrition and, if irrigated, with adequate water. The hybrids were ATx623/RTx430, ATx623/REx16-6, Texas 610SR and E57+. Grain yield was determined from an 8.0 m^2 quadrat from the inner two rows of each plot. Grain yield response of each hybrid over environments was examined by regressing grain yield on environment mean grain yield. Further details have been presented elsewhere (1,2).

Results and discussion

Environment mean grain yield ranged from 1.81 to 9.95 t/ha (2). The hybrid ATx623/RTx430 was highest yielding on average, and was more responsive to increasingly favourable environments (Table 1). The other three hybrids n other, but they were less responsive to favourable environments than ATx623/RTx430.

When environment main effects were removed, the nature of the genotype by environment interaction was more evident. The two ATx623 hybrids generally yielded more than the environment mean, with ATx623/REx16-6 performing better in less favourable environments, and ATx623/RTx430 performing better in more favourable environments. We examine possible causes of these responses in companion papers (3,4,5).

Table 1. Intercepts (a), slopes (b), and coefficients of determination (R^2) for linear regression of grain yield on environment mean grain yield for four sorghum hybrids over 18 environments.

Hybrid	a	b	R^2
ATx623/RTx430	-72 c[1]	1.07 c	0.97
ATx623/REx16-6	204 c	0.97 d	0.97
Texas 610SR	6 c	0.97 d	0.98
E57+	-138 c	0.98 d	0.98

[1] Values in each column followed by the same letter do not differ significantly (P = 0.05)

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