

Genotype by environment interaction for transpiration efficiency in grain sorghum

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Sorghum hybrid ATx623/RTx430 was found to yield more than hybrid Texas 610SR in high yielding environments, but the two hybrids yielded similarly in low yielding environments (1). In this paper we report glasshouse transpiration efficiency (TE) which may explain some aspects of these differences.

Methods

Plants of hybrids ATx623/RTx430 and Texas 610SR were grown in a glasshouse in spaced, large pots with adequate fertility. Water limitation treatments were imposed from floral initiation to flowering by daily watering to weight. The levels ranged from complete replenishment of water transpired to 25% of that amount. Soil evaporation was minimized by use of mulch. Above ground biomass was measured at flowering. TE was calculated as the ratio of biomass to water transpired over the treatment period. Whilst this is not the true transpiration efficiency, as root biomass and water transpired prior to initiation were not included, TE provides a useful comparative index.

Results and discussion

TE was plotted against degree of water limitation (TRATIO) (Fig. 1). Texas 610SR was more efficient than ATx623/RTx430. Difference between the two hybrids was greater for increased degree of water limitation (i.e. low values of TRATIO). Possible mechanisms associated with this response are considered in a companion paper (2). In low yielding environments associated with water limitation this result suggests Texas 610SR would produce more biomass and hence, possibly higher grain yield, than ATx623/RTx430. Both hybrids performed similarly in such environments (1) suggesting that higher radiation use efficiency of ATx623/RTx430, as discussed elsewhere (3), may compensate for its lower TE in such water limiting environments.

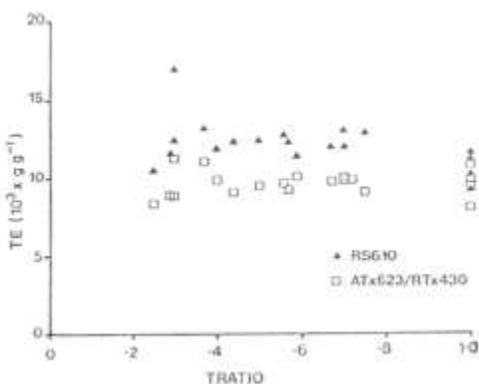


Fig. 1. Transpiration efficiency lower TE in such water limiting (TE) versus degree of water environments. limitation (TRATIO).

1. Wade, L.J. et al. 1989. Proc. Aust. Agron. Conf., Perth
2. Hubick, K.T. et al. 1989. Proc. Aust. Agron. Conf., Perth
3. Hammer, G.L. et al. 1989. Proc. Aust. Agron. Conf., Perth

