

## Variation in water use and dry matter production among peanut cultivars grown under moisture deficit

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Peanut (*Arachis hypogaea* var. *hypogaea*) is generally grown under rainfed conditions and subjected to periodic droughts, which decrease seed yield. Yield under these conditions can be analysed into the components of total watertranspired (T), efficiency of water use (WUE), and harvest index (HI) <sup>1</sup>. Studies were conducted to determine the effects of moisture deficit at different growth stages on these components and to examine the variation in them among a diverse range of genotypes.

### Methods

Six peanut, selected for their differences in flowering pattern, HI and WUE<sup>(2)</sup> were grown under either irrigation after 30 mm of cumulated pan evaporation or a moisture deficit of approximately 180 mm c.p.e.(effected by use of a rainout shelter) during either pod filling or, for four entries, early reproductive growth. T (from Neutron moisture readings to 1.8 m depth) and TDM (including roots to .3 m) and its distribution to plant parts were recorded. Leaf water potential was monitored weekly, and at the end of the stress, the osmotic potential and relative water content of stress and irrigated plants determined.

### Results and discussion

The moisture deficit treatments, where midday 1 values were as low as -2.9 and -2.7 MPa (Table 1), resulted in an average reduction in TDM of 20 and 22% during the reproductive and pod filling stage, respectively. There was a significant cultivar by moisture deficit interaction. Although water use differed among the cultivars (Table 1), the different responses in TDM were associated with significant differences in WUE.

**Table 1. Minimum leaf water potential, T, TDM and WUE of peanut cultivars grown under moisture deficit**

Cultivar	Leaf water potential (MPa)	Water use (cm)	TDM <sub>2</sub> (g m <sup>-2</sup> )	WUE (g DM kg <sup>-1</sup> H <sub>2</sub> O)
Virginia Bunch	-1.95	15.08	657	1.22
McCubbin	-2.88	11.55	768	2.89
Tifton-8	-1.45	12.82	371	1.43
Chico	-2.33	10.57	340	2.12

In addition to effects on TDM, moisture deficits during the early reproductive period also decreased HI in all cultivars except Chico. When water deficit occurred during the pod filling stage, seed yields and TDM were reduced proportionally in Virginia Bunch (49%) and Tifton-8 (48%). Comparable figures for other cultivars ranged from 4 to 23%. There were also differences in osmotic adjustment. The drought adaptive mechanisms that allowed some cultivars, and not others, to produce dry matter and to use water more efficiently under stress and maintain HI are being studied further.

1. Passioura, J.B. 1977. J.Aust.Inst.Agric.Sci. 43 559-65.

2. Hubick, K.T., Farquhar, G.D. and Shorter, R. 1986. Aust. J. Plant Physiol., 13, 803-16.