

## Drought adaptation studies on soybeans in the Murrumbidgee Valley

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Drought adaptation can be defined as the extent to which plant production (yield with respect to soybeans) is maintained in the presence of a soil water deficit. Seven indeterminate lines with apparent drought adaptation were identified from among 70 random inbred lines from a Williams x Calland (WIC) cross made at the University of Sydney. They have performed well under natural rainfall conditions in inland northern N.S.W. and some have shown a high yield potential under full irrigation in south-western N.S.W.

### Methods

Some of the lines and others from more recent crosses of the same parents have been compared with the check variety Clark 63 over three seasons at the Leeton Field Station. Following successful establishment, the plants were subjected to two irrigation regimes - irrigation intervals of either 75 or 150mm of estimated evapotranspiration - until they reached physiological maturity. Phasic development, dry matter production, seed yield (and its components) and leaf water potential were measured.

### Results and Discussion

All entries were of indeterminate growth habit with flowering occurring over at least 40 days. WIC 67 and Clark had similar maturity dates with WIC 70 7-10 days later. As the 75mm interval was irrigated every 7-10 days during flowering and early podfill, irrigation timing in relation to phenology should not have greatly influenced the results. Seed yields from two of lines tested in all three seasons and Clark 63 are shown in Table 1. In two seasons pod number per plant contributed most to the yield differences with individual seed weight being of equal importance in the third season.

**Table 1. Seed yield from three soybean lines (mean of three consecutive seasons - 1981/82 to 1983/84).**

Line	Irrigation interval		Depression*
	75mm	150mm	
	t/ha	t/ha	%
WIC 67	3.2	2.6	19
WIC 70	3.6	2.8	22
Clark 63	3.0	2.2	27

\* Yield decrease at 150mm as a percentage of yield at 75mm.

Leaf water potentials measured in 1981/82 indicated that although the WIC lines were as stressed as Clark 63 in mid-afternoon, in the morning and in the evening they were able to maintain higher (less stressed) potentials. Presumably, this has allowed more efficient use of incoming radiation, reflected in greater dry matter production by the end of flowering and subsequently in seed yield.

The ability to more successfully maintain seed yield under moisture stress is seen as a desirable characteristic of soybean varieties for the semi-arid environment of the irrigation areas of south-western N.S.W. WIC 67 has recently been released as the variety Lawry and WIC 70 will be released as Farrer for sowing in 1984/85. Both have performed well under commercial conditions.

