

Some limitations to high soybean yields in southern N.S.W.

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There is tremendous potential for expansion of soybean production in the southern irrigation areas of N.S.W. However the acreage has remained small (600 hectares) and commercial yields have been very low" (1.2 t ha⁻¹). An experiment in 1977 at Leeton Agricultural Research Station (34°30'S, 146°25'E) examined yield potential of soybeans and the relative importance of irrigation interval, sowing date and variety. Irrigation intervals of 75 mm (adopted to maintain soil moisture at adequate levels) or 150 mm of estimated evapotranspiration were applied to soybean varieties. Hark (early maturing), SRF 400 (mid or adapted) and Essex (late) sown at monthly intervals.

A split-split plot design was used with irrigation intervals as main plots split for sowing date and again for variety. Plots were four 75 cm rows x 15 metres with the central two rows x 7 metres harvested for seed yield. A population of 25 plants m⁻² was established by oversowing and thinning.

All main effects and interactions were significant (P<0.05) except for the irrigation interval x sowing date interaction. Irrigation interval had the greatest effect.

TABLE 1. Effect of irrigation interval, sowing date and variety on yield of soybeans (t ha⁻¹).

| Irrigation Interval | Variety | Sowing Date | | | |
|---------------------------------------|---------|-------------|--------|--------|--------|
| | | 27 Oct | 10 Nov | 12 Dec | 19 Jan |
| 75 mm | Hark | 4.19 | 3.35 | 4.16 | 3.18 |
| | SRF 400 | 4.19 | 4.31 | 4.13 | 3.34 |
| | Essex | 3.46 | 3.52 | 2.73 | 1.99 |
| 150 mm | Hark | 3.44 | 3.18 | 2.99 | 2.28 |
| | SRF 400 | 3.35 | 3.34 | 3.11 | 2.67 |
| | Essex | 2.73 | 2.89 | 2.55 | 2.00 |
| L.S.D. (P<0.05) Between any two means | | 0.26 | | | |

Extending the interval to 150 mm reduced seed yield of all varieties and sowing dates by 19 per cent. Essex was least effected as it made more vigorous growth under the stress conditions. There was only a small difference in the yield of Hark and SRF 400 when sown between 27 October and 12 December. There is no apparent reason for the exception of Hark sown on 10 November. Low temperatures during April reduced seed filling and subsequent seed weight of Essex sown on 12 December and all varieties sown on 19 January.

This study demonstrates that soybean yields can be achieved comparable to any of the other major soybean producing areas. A wide range of flexibility exists for sowing time and varietal maturity range. Irrigation management is the most important factor determining yields in this region. Stress during any stage will reduce yield, although late flowering and pod filling is the most critical stage (J.A. Thompson pers. comm.).