

## Limitations to the yield of soybeans in a Tropical Environment

A.L. Garside and D.E. Crowther

Dept. of Prim. Ind., P.O. Box 591, Ayr, Old 4807

Studies conducted in the Burdekin River Irrigation Area (BRIA), North Queensland (Lat. 19°36'S, Long. 147°25'E) on a heavy cracking clay soil suggest that the yield of soybeans may be limited by the traditional Method of furrow irrigation because land is wasted by the need to provide furrows. In addition, intermittent waterlogging occurs when crops are irrigated. Methods

In an experiment at Millaroo Research Station soybean cultivars Canapolis and Buchanan were sown at plant populations of 100, 200, 300 and 400 x 10<sup>4</sup> ha in four different arrangements - ridges 75 cm apart (75R) or on 1.5 m beds with either 2 x 75, 4 x 30 or 6 x 20 cm rows. The experiment was furrow irrigated after every 50 mm of accumulated class A pan evaporation.

At harvest two different samples were taken to estimate yield. One sample comprised two ridges or a 1.5 m bed x 5 m and was termed practical seed yield. With the other sample, biological seed yield, the centre four rows in the case of 6 x 20 cm rows and the centre two rows in the case of 4 x

30 cm rows were harvested separately to the remaining rows on a bed (Fig.1) The same sample was used for practical and biological seed yield in the case of 75 cm rows on beds and ridges.

### Results and discussion

Discussion is restricted to the effect of row spacing. In terms of practical seed yield there was no difference between any of the row spacings with yield being of the order of 3.7 t ha<sup>-1</sup>. However, biological seed yields were considerably higher with the narrower rows.

Row Spacing (cm)	20	30	75	75R
Biological seed yield (t ha <sup>-1</sup> )	5.0	5.5	3.6	3.8
LSD: (P<0.01) = 0.37				

Obviously part of the reason is that both 20 and 30 cm rows are covering only 1.2 m yet for practical seed yield determination they are being assigned 1.5 m. However, the traditional border effect, where outside rows on a bed in the 20 and 30 cm row spacings could be expected to yield higher than internal rows, did not occur. In fact the outside rows yielded less than the internal rows viz. 3.6 and 5.5 t ha<sup>-1</sup> respectively. This may be associated with their proximity to the irrigation furrow and thus exposure to water for an extended period during irrigation while waiting for the centre of the bed to be wet by lateral infiltration.

These results suggest that soybean yields on heavy cracking clay soils in the BRIA, and it is suspected other areas in the tropics, are being limited by restrictions imposed by the irrigation technique. The use of solid seeding in narrow (20-30 cm) rows, with an appropriate irrigation technique e.g. sprinkler or border check, is likely to be an avenue to improved yields. Studies are continuing.

**FIG 1 - Arrangement of rows for (A) 4 x 30 cm and (B) 6 x 20 cm rows on a 1.5 m bed. Biological seed yield was determined by sampling rows 2 and 3 in (A) and 2, 3, 4, and 5 in B. Practical seed yield was determined by harvesting all rows across the bed.**

