

No tillage wheat production in northern New South Wales

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In northern New South Wales wheat yields are strongly dependent on moisture stored during a summer-autumn fallow. Three factors influencing efficient fallowing are: (1) maintaining infiltration - this is determined by the stability of the soil surface aggregates; (2) reducing evaporation and run-off - undecomposed stubble on the surface reduces evaporation and run-off; (3) minimising weed growth to reduce transpiration losses.

Clean cultivation has been the traditional system of fallowing for many years. However, there is an increased awareness of the risk of erosion with this practice because of reduced structural stability and the removal of protective organic material. To reduce erosion many growers are now retaining stubble and have adopted techniques of reduced cultivation, mainly using a blade plough. This reduces erodibility relative to a bare fallow but only marginally improves aggregate stability (Marston personal communication). Elimination of mechanical soil disturbance other than at sowing is believed to have considerable potential as an improved system with respect to soil structure and erodibility.

The two initial problems with no-tillage are: 1) Effectively controlling weeds with herbicides which requires a knowledge of (a) what herbicide(s) to use for a particular problem; (b) what rates to use; (c) when to apply them; (d) what are the best methods of application. This requires an evaluation of many products over a wide range of weeds and environmental conditions. As well as effective control it is essential to know of any undesirable residual or non-target characteristics.

3) Sowing into undisturbed soil which has an uneven surface and carries the stubble residue of the previous crop. For the last three seasons small no-till areas have been sown by several growers at Moree using modified conventional equipment. The plant stand obtained has been variable because of uneven placement and often poor seed coverage.

At Canberra the GSIRO have developed the SIROSEEDER to overcome this problem. This machine was tested at Tamworth in the 1979 season. Adjacent areas (each 1.5 ha) were prepared for sowing by: (a) disc ploughing and several pre-sowing cultivations (i.e. conventional); or (b) spraying to control weeds. This consisted of dicamba 0.5 kg ha⁻¹ (9 Feb); dicamba 0.5 + glyphosate 0.46 kg ha⁻¹ (20 Mar); glyphosate 0.36 kg ha⁻¹ (34 May); 3,4-D ester at 0.8 kg ha⁻¹ (8 June).

Eight wheat cultivars, and one barley and one triticale cultivar were sown at 35 kg ha⁻¹ on 5 July in four randomised complete blocks in each area. Plots were 13 x 25 cm rows x 50 metres. Crop establishment was assessed on 15 August by plant counts in four quadrats per plot each one metre x four rows. The mean establishment for the 10 cultivars in the no-till area was 53 plants m⁻³ and 47 plants m⁻¹ in the conventional. There were no apparent interactions between cultivars.

This site had a low stubble residue (approx. 3 t ha⁻¹) and the SIROSEEDER operated without blockages. However at another site at Moree (approx. 5 t ha⁻¹ stubble) the SIROSEEDER was unable to sow through the thick stubble.

Future work is planned to obtain information on the effects of no-tillage on weed populations, nutrient distribution in the profile and the value of legumes in the system.