

## **No-tillage for conservation or arable soils in the northern wheat belt of Australia**

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The control of soil erosion is a continual problem on most arable soils. In the northern wheat belt, soil loss can be aggravated by fallow tillage during the period from October to March (Rosewell and Marston 1978). Such tillage can break down soil aggregation and reduce protective residues.

Practices involving stubble retention are being used to reduce soil erosion but in some situations they do not reduce soil losses to acceptable levels. Examples are low slope plains where large volumes of extraneous overland flow runoff are experienced and areas where row-cropping is practised.

No-tillage is a crop management practice in which there are no cultivations during the fallow period between subsequent crops. All weed control is achieved by the use of herbicides and the next crop is sown directly into undisturbed soil through the remaining stubble and weed residue (Marston 1978).

During the three years that no-tillage has been trialled at Gunnedah Soil Conservation Research Centre an average of four applications of herbicide per fallow have been applied. These have been of a non-residual contact herbicide. There has been no grazing of the stubble or weed growth. Sowing has been achieved by using a modified scarf-seeder with narrow tynes on 300mm row spacing and press wheels behind. Only 35% of the soil surface has been disturbed at sowing but some loose soil thrown between the rows has caused weeds to germinate.

There have been no significant agronomic differences between the no-tillage wheat crop and that grown by stubble incorporation or mulching. However, there have been significant differences in the soil erosion resulting from these practices. Runoff and soil loss is significantly reduced by no-tillage when measured under rainfall and simulation studies. A natural rainfall event in May 1978 caused considerable rill erosion in the stubble incorporated treatment but none in the no-tillage treatment.

No-tillage has resulted in an improvement in soil structural stability when compared with mechanical tillage practices over three years (Marston 1979). This improvement in structural stability is very important for this black earth soil which slakes rapidly on wetting (Marston and Hird 1978).

There are still many aspects of no-tillage that require investigation. However, preliminary research indicates that it is a feasible management practice of great soil conservation potential. No-tillage is a system that closely resembles the naturally stable grass sward which is characteristic of the area yet it enables crops to be grown continuously with a low erosion hazard.

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