## Conservation tillage in southern New South Wales

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Quantitive data concerning the rate and extent at which conservative tillage practices affect soil physical and chemical properties in Australia are limited. Although the conservation tillage practices research programme (Contillprac - commenced 1980) is still current, definite trends in soil properties are evident after 4 years of continuous cropping. Agronomic and economic data also exhibit benefits in favour of conservation tillage.

## Method

To study effects on different soils with slightly different climates, 6 sites were chosen (3 near Parkes, 2 near Grenfell and 1 at Cowra). The tillage treatments imposed are traditional tillage (TT), reduced tillage (RT) and direct drilling (DD). A further treatment, at Cowra only, is direct drilling without grazing (NT). All treatments are on paddock size plots to enable normal farming techniques to be applied by the co-operating farmers. Experimental measurements, replicated within the areas, taken annually are organic matter content, aggregate stability, total N, available P, germination counts, yield, costs and income. At 3 sites, further soil physical data obtained are bulk density (0-10 cm and 0-4 cm), runoff and sediment loss using a rainfall simulator, saturated hydraulic conductivity and sorptivity. To obtain accurate records of agronomic and economic data a detailed diary of operations, soil conditions and costs is kept by each operator.

## **Results and Discussion**

Data collected and analysed so far can be generalised as follows.

i) Minimal soil disturbance is the major reason for the increase in organic matter content of soils where conservative practices have been imposed. The largest increase (25%) has occurred where the only disturbance is at sowing with a combine that has narrow points and disturbs soil only in the sown rows. Where conservation tillage systems have employed more soil disturbance organic matter contents have generally been lower.

ii) Increasing organic matter has improved aggregate stability making it less susceptible to raindrop impact, consequently surface crusting, runoff and soil erosion.

iii) Bulk density has not changed drastically to date. However, in treatments where organic matter levels are increasing the 0-4 cm bulk density is becoming lighter.

iv) Measurements of runoff and sediment loss have been variable between years because of different grazing pressures during the fallow and the rain received during the previous season. However, within a year data indicate that runoff from the TT treatment > RT and DD treatment >> NT treatment. Similarly sediment loss data show TT > RT > DD >> NT. Biological activity and continuous pores are probably the major reason for the improved infiltration in the less disturbed treatments. During the programme the effects of grazing in the fallow period on soil properties has been significant, because improvement rates have been slowed, especially with overgrazing.

v) Germination counts have not been affected by conservation tillage practices and yield has been the same or higher when compared to the TT treatments.

vi) Total N and available P measurements have shown small increases in the conservative practices which is related to the improvement in organic matter content and organic nutrients.

(vii) Economic analysis is showing increased or similar profitability can be achieved with conservative tillage practices compared to traditional methods. This is, however, dependent on applying the correct and most efficient technology available.

The Contillprac programme will be continued and it is expected that the aspects discussed will be confirmed.