

Soil conservation effectiveness of stubble in different tillage practices

I.J. Packer and R. Doust

Soil Conservation Research Centre, Cowra. 2794

Conservation tillage and stubble retention has often been recognised as a means of reducing soil erosion (e.g. 1,2,3.). Data from the conservation tillage practices research programme (Contillprac) at Cowra Research Centre, commenced in 1980, confirm the benefit of conservative tillage practices in reducing soil erosion. However, although stubble retention is beneficial regardless of tillage practices in reducing erosion, it is more effective when combined with conservative tillage practices.

Methods

Rainfall simulation experiments were conducted on four tillage treatments, traditional tillage (TT), reduced tillage (RT), direct drilling with grazing (DD) and without grazing (NT), established in 1980. The soil is a hardsetting red texture contrast soil, with a sandy loam surface texture.

All simulations were carried out on settled soils following a growing season and a summer/autumn fallow. Experiments were conducted on plots with;

(i) a bare soil surface and (ii) 3 to 3.5 t/ha of stubble maintained on the surface. The simulated rain applied had an intensity of 45 mm/hr and a duration of 40 minutes (30 mm of rain).

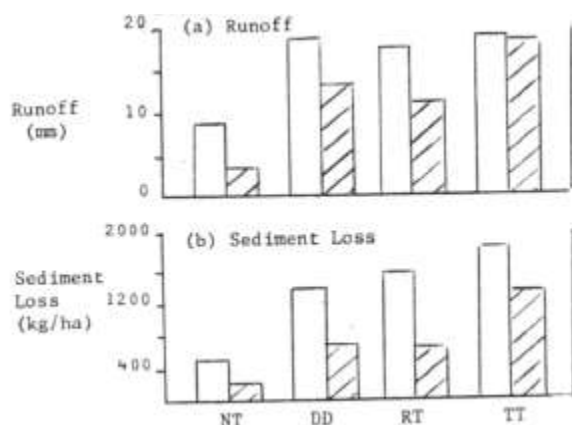


Figure 1. Average runoff (a) and sediment loss (b) data from tillage treatments with a bare soil surface (open columns) and a stubble covered surface (shaded columns).

Total runoff and sediment loss were significantly reduced in the NT treatment with and without stubble compared to the other treatments (Figure 1(a) and (b)). This was due to the measured higher organic matter and aggregate stability which enabled the soil in this treatment to resist the affect of raindrop impact and surface sealing. When stubble was maintained on the surface, both runoff and sediment loss were significantly reduced in the RT and DD treatments but not in the TT treatment. No significance was obtained in the TT treatment because of the soil settlement which had occurred due to the large degree of degradation caused by cultivation since the trial commenced. In conclusion conservative tillage practices will reduce erosion risk. However, to gain maximum benefits of erosion control with stubble retention it must be combined with conservative tillage practices.

References

1. Dickey, E.C. et al. 1983. Trans. of ASAE. 814-820

2. Freebairn, D.M., and Wockner, C.D. 1984. Qld. Ag. J. 110: 227-234
3. Sdiras N. et al. 1982. 9th Conf. of Int. Soil Till. Res. Org. 537-544.