

THE ROUGH AND SMOOTH OF RAINFALL CAPTURE IN THE MARANOA

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A catchment study was established near Wallumbilla in 1982 to investigate the influence of tillage and stubble management on water balance and erosion in the Maranoa. When runoff and soil movement did occur, two broad categories of tillage could normally be recognised, being *rough* and *smooth* cultivation, i.e. where tillage resulted in significantly different micro-relief.

MATERIALS AND METHODS

The catchment site is at *Fairlands*, Wallumbilla (26° 28'S, 149° 06'E), 45 km east-north-east of Roma in the Maranoa. The sloping (2%) hard-setting brown clay soil supported brigalow (*Acacia harpophylla*) and belah (*Casuarina cristata*) vegetation prior to clearing in 1963 and has been cropped continuously since 1966. Salts are concentrated at 40-50 cm, and 80% of potential plant available water (100 mm) is held in the surface 60 cm. The mean rainfall is 587 mm with 68% falling in the period October-March inclusive. Tillage practices applied ranged from no-till through to rough chisel cultivation.

RESULTS AND DISCUSSION

- between tillage treatments were often less than expected because the majority of runoff events occurred late in the fallow when treatment differences were less pronounced and stubble cover was low.
- as a percentage of total rainfall is similar to that recorded on the eastern Darling Downs (Black Earth and Grey Brigalow Clay), with 10% and 9% of annual rain becoming runoff, respectively. The majority (70%) of total runoff occurred during the summer fallow.
- years (1982-92) of runoff and soil water data demonstrated that the rougher chisel tillage was marginally (an extra 9 mm) a more efficient means of storing fallow rainfall. This corresponded with 10 mm less runoff from the *rough* treatment. The extra moisture stored resulted in an 0.17 t/ha yield increase. Computer simulation using the PERFECT model also predicts that tillage management will influence runoff, but have little influence on median yield.
- statistical analysis of runoff indicated that roughness was more important than cover for this soil in terms of improving infiltration. This result is biased by the fact that cover levels are generally low in the more arid Maranoa environment.
- cultivation early in the fallow when the soil profile is dry, can close cracks and impede water entry. Water movement via cracks can occur during intense rainfall, and losses from evaporation are likely to be lower compared to *top down* wetting of the profile.

CONCLUSIONS

The study demonstrated that runoff and soil movement can be reduced where stubble and/or roughness is retained on the soil surface. Improving infiltration of a hard-setting soil is difficult with tillage and stubble management in a marginal climatic environment.