

The effect of erosion on grain yield at Wagga Wagga

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Soil erosion reduces crop yield, but few quantitative data are available linking soil loss and productivity. Hamilton (1) reported a grain yield decline of approximately 45% at Wagga Wagga following a single-event removal of 75 mm of soil (i.e., approximately 940 t/ha). Soil conservationists in this region have assumed a soil loss of 2 t/ha/yr (0.2 mm/ha/yr) to be a tolerable rate of erosion.

Aveyard (2) reported grain yield and protein data from plots that had experienced varying crop rotations and degrees of erosion over a 30-year period at Wagga Wagga. Total soil losses ranged from 3.72 t/ha (0.3 mm/ha/yr) to 80.76 t/ha (6.4 mm/ha/yr). Mean maximum yield depression over a two-year period was approximately 50%. It was concluded that tolerable rates of erosion may be much lower than once thought.

Further examination of data from this experiment illustrates that erosion not only produces an absolute loss of yield but also that the recovery of the productive capacity of the soil may be extremely slow.

Total 30-year soil loss from the same 0.01 ha plots under a wheat-fallow crop rotation, compared to grain yield obtained in 1977 and 1980, is shown in Figure 1. Grain yield is expressed as a percentage of the yield from the plot with least erosion (11.35 t/ha or 0.91 mm/ha/yr). Relative grain yield following the most and least erosion, changed little over the 4 year period. This was despite a general improvement in crop management practices.

Interestingly, in the middle of the erosion range, crop yield between plots and years was much more variable. This suggests that factors other than the amount of soil loss are operating to affect yield.

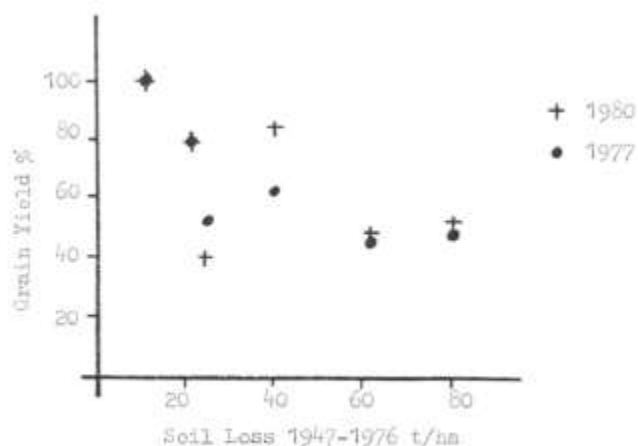


Figure 1. Long Term Soil Loss and Subsequent Relative Grain Yield from 0.01 ha Plots at Wagga Wagga.

1. Hamilton, G.J. 1970. Jour. Soil Cons. NSW. 26.
2. Aveyard, J.M. 1981. Proc. Third Australian Soil Conservation Conference. 299-302.