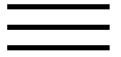


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## Journal of Contaminant Hydrology

Volume 20, Issues 3&#x2013;4, December 1995, Pages 313-327

# Management practices for minimising nitrate leaching after ploughing temporary leguminous pastures in Canterbury, New Zealand

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[https://doi.org/10.1016/0169-7722\(95\)00076-3](https://doi.org/10.1016/0169-7722(95)00076-3)

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## Abstract

Winter leaching losses of nitrate following the ploughing of temporary leguminous pastures in late summer or early autumn are a major concern in mixed cropping rotations on the Canterbury Plains of New Zealand. Field experiments showed that pastures ploughed in early autumn (March) and left fallow accumulated  $107\text{--}142\text{ kg ha}^{-1}\text{ N}$  of mineral-N in the soil profile by the start of winter, with  $72\text{--}106\text{ kg ha}^{-1}\text{ N}$  lost through leaching in the first winter. Delaying the ploughing of pasture until late autumn (May) reduced the accumulation of mineral-N to  $42\text{--}120\text{ kg ha}^{-1}\text{ N}$  and the leaching loss to  $8\text{--}52\text{ kg ha}^{-1}\text{ N}$ .

In situations where early cultivation cannot be avoided, growing winter cover crops or using the nitrification inhibitor dicyandiamide (DCD) both have the potential to reduce leaching compared with fallow soil. DCD increased the amount of mineral-N present in the soil as ammonium and reduced leaching losses by 25–50% without affecting the yield of the following spring wheat crop.

Cover crops only reduced leaching losses (by up to 60%) when they were sown early in the autumn and they had taken up considerable amounts of soil mineral-N before drainage occurred. When cover crops were grazed before incorporation in spring, there was an increased risk of leaching from urine patch areas. If residues were incorporated without grazing, however, the yield of the following spring wheat crop was depressed by 20–30% due to extensive net N immobilization during decomposition of the residues.

In Canterbury conditions, the most reliable way to minimise N leaching losses is to delay the ploughing of pasture for as long as possible in autumn or winter. Where pastures are ploughed early, the relative effectiveness of using DCD or growing winter cover crops varies mainly in relation to rainfall distribution.



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