

SHORT-TERM EFFECT OF LAND USE CHANGE ON DISSOLVED ORGANIC CARBON DYNAMICS IN PASTORAL HILL COUNTRY

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Land use change from perennial pasture to forage cropping is rapidly being adopted in New Zealand hill country in order to increase animal feed production. Such changes in land use may have implications on the leaching and availability of dissolved organic carbon (DOC) in subsoils. DOC is a major factor limiting subsurface denitrification, therefore changes in DOC dynamics could impact on nitrate leaching to ground and/or surface waters. In this study, the effect of agrochemicals, particularly glyphosate (used for clearing out pasture before crop establishment) on DOC dynamics was studied to understand how these affect the net quantity and quality of DOC in the soil profile. The study was carried out on a Massey University's hill country farm near Palmerston North. Two treatments were monitored – pasture and cropping. The cropped plots were sprayed out (one-off application) with glyphosate at 4 L/ha before they were surface sown (no cultivation) to swedes (*Brassica napobrassica*). Soil samples were collected from various depth increments to a depth of 1 m, prior to and after (Day 1, 6 and 12) herbicide application. The results showed that glyphosate (which contributed > 50 mg/kg to the total carbon content of the soil) significantly increased DOC in the surface 5 cm of the soil on Day 1 and 6. A modelled daily water balance for the soil with a plant available water of 22.5 mm H₂O per 100 mm soil predicted a fairly static system with regard to solute transport – this supports why significant differences were recorded only in the top 5 cm of the soil. Carbon aromaticity in DOC increased with soil depth, indicating the easily degradable nature of the agrochemicals. Seasonal monitoring of the treatments will enable definite conclusions to be drawn regarding the effect of crop establishment and soil moisture on DOC dynamics.