

ROLE OF SHELTERBELTS IN SEQUESTERING SOIL CARBON IN NEW ZEALAND GRAZED PASTURES

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Intensive pastoral farming with year-round grazing results in contamination of land and waterways, and leads to greenhouse gas emissions. Planting shelterbelts on grazing farms could be a potential option to combat these environmental issues. Shelterbelts do not only help sequester carbon (C) aboveground but also contribute to build C in the soil close by thus mitigating the emission of carbon dioxide to the atmosphere. Trees also help regulate excessive nutrient flow (such as nitrogen (N)) in surface and sub-surface soil, and thus mitigate N leaching and gaseous losses. Despite their numerous benefits, there is a limited information available on the role of shelterbelts, especially in temperate pastoral systems.

We plan to conduct measurements of total soil organic C in paddocks with and without shelterbelts. Here we have selected 10 farms across North and South Island of New Zealand to undertake these measurements. Currently we are presenting the data on soil C for selected studied sites. This work is part of a larger study where the influence of shelterbelts on C sequestration, N cycle, and animal welfare is investigated.

For the measurement of soil C, we collected three replicated soil cores (D = 4.35 cm, L = 60 cm) from selected paddocks with and without shelterbelts on two dairy farms in the Manawatu region of New Zealand. The soil cores were collected from distance of 1 m, 5 m, 10 m, 20 m, 40 m and 80 m from the shelterbelts or from the boundary of the paddock where there is no shelterbelt. We divided each soil core into 5 segments. These were air dried, ground and sieved to 2 mm. Subsamples were further ground to < 0.3 mm for total C content measurement using elemental analyzer.

We found that the organic C content decreased in soils as the distance from the shelterbelts (and the sampling depth) increased. Overall the paddocks with shelterbelts have higher soil C content than the paddocks without shelterbelts. We are currently sampling paddocks in additional farms to ensure the results obtained so far are representative of New Zealand pastoral systems.

Editor's note: *An extended manuscript has not been submitted for this presentation.*
