

ESAI Best Sustainable Food or Sustainability Presentation at Environ 2026

Effects of recycling derived fertilisers versus conventional fertilisers on soil nematode communities in Irish wheat field trials

¹Lilian Salisi Atira, ¹Kieran Germaine, ²Richie Hackett, ¹Thomais Kakouli-Duarte

¹Molecular Ecology and Nematode Research Group, enviroCORE

Department of Applied Science,
South East Technological University,
Kilkenny Road, Carlow, Ireland

²Teagasc, Crops Research Centre, Oak Park, County Carlow, Ireland

In Europe, over 6 million tonnes of nitrogen (N), phosphorus (P) and potassium (K) synthetic fertilisers are imported annually to support agriculture. These synthetic inputs rely heavily on fossil fuel and mined materials, making them costly to produce and transport. The production also causes environmental challenges such as biodiversity loss, habitat fragmentation and land degradation at mining sites, while their transportation contributes to greenhouse gas emissions.

At the same time, nutrients are lost as organic waste across the region. Recycling derived fertilisers (RDF) from nutrient recovery technologies offer a sustainable alternative, closing the nutrient loop in agricultural systems and reducing dependency on synthetic fertilisers.

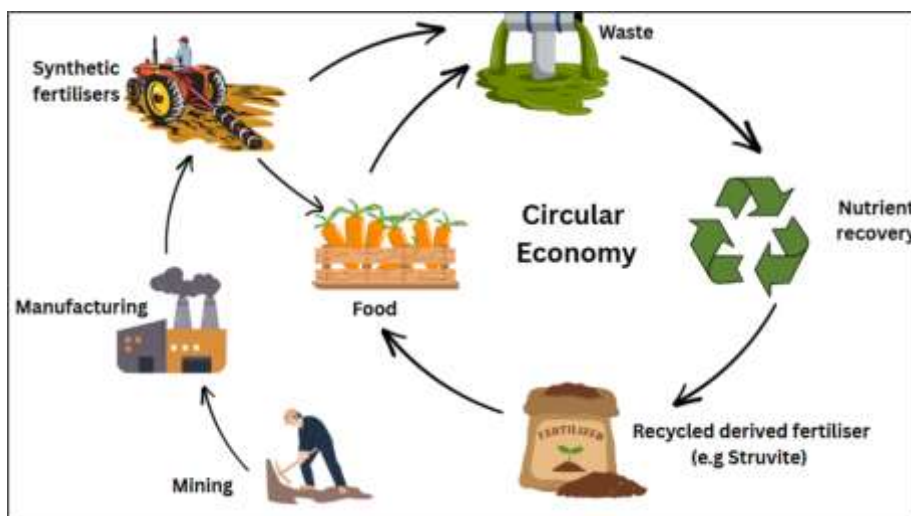


Figure 1. Schematic representation of the circular nutrient loop. Nutrients recovered from waste through nutrient recovery technologies are used as fertilisers for food production and excess waste recycled again closing the nutrient loop.

However, their ecological sustainability especially their impact on soil health remains underexplored. In this study, soil nematodes were utilised as bioindicators of soil health to assess the effects of RDF versus conventional fertilisers in Irish wheat trials. P based RDF struvite and digestate were tested alongside conventional triple superphosphate (TSP) in Irish wheat trials conducted in 2024 and 2025 at Teagasc, Crops Research centre, Oak Park, in County Carlow. Findings indicated that, in both trials, RDF performed comparably to conventional TSP fertiliser in terms of soil health with no adverse ecological effects. The nematode diversity and composition remained unchanged relative to conventional TSP and the control. These findings support the further development of circular nutrient solutions as ecologically responsible alternatives to synthetic fertilisers.



Lilian.Atira@postgrad.setu.ie LinkedIn