

CONTRIBUTION OF 'ROCHA' PEAR SENESCENT LEAVES TO NITROGEN CYCLING IN ORCHARDS

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Abstract:

The weight loss (WL) of decomposing 'Rocha' pear senescent leaves and the evolution of their nitrogen (N) and carbon (C) contents were studied using two techniques: litter-bags and directly on the soil surface using PVC cylinders. At leaf fall, leaves from one- and two-year-old trees fertilized with 0, 10 and 40 kg N ha⁻¹ year⁻¹ were collected and the litter-bags were installed in October 2003 (A) and February 2005 (B) at the soil surface in the original orchard located in Cadaval (Portugal). Senescent leaves were also collected from three- and four-year-old 'Rocha' trees fertilized with 40 kg N ha⁻¹ year⁻¹ and were placed in October 2003 (C) and February 2005 (D), respectively at the soil surface using PVC cylinders pushed into the soil without soil disturbance, in the same orchard. Pear trees returned to the soil between 1.0 (A) and 6.4 (D) kg N ha⁻¹ year⁻¹ in the senescent leaves. In experiment [A], leaves from unfertilized trees presented greater WL (73%) and less leaf N (44% of initial leaf N) after 506 days (d) of decomposition, than leaves from fertilized trees, whereas in experiment [B] no significant differences after 641 d were observed (82% WL and 25% of initial leaf N). A higher decomposition rate was determined for senescent leaves in the soil cores ($k=-0.0047\text{ d}^{-1}$) (C and D) compared with the litter-bags ($k=-0.0025\text{ d}^{-1}$) (A and B), although initial leaf C/N ratios were 31 and 28, respectively. In pear orchards, the amount of immobilized N in the soil following leaf fall depended on rainfall and temperature conditions. Soil N mineralization occurred between June and November/December with average air temperature of 19°C and about 300 mm rainfall, in a period when pear N uptake is mainly used to build up the trees' N reserves for the following year.