



## Senescent leaf decomposition in a Mediterranean pear orchard

Cláudia Neto<sup>a,b,\*</sup>, Corina Carranca<sup>a</sup>, Josué Clemente<sup>c</sup>

<sup>a</sup> L-INIA, Quinta do Marquês, Av. República, 2784-505 Oeiras, Portugal

<sup>b</sup> Instituto Superior de Agronomia, Technical University of Lisbon, Tapada da Ajuda, 1349-017 Lisboa, Portugal

<sup>c</sup> Selectis, Herdade das Praias, Apartado 120, E.C. Bonfim, 2901-877 Setúbal, Portugal

### ARTICLE INFO

#### Article history:

Received 22 February 2008

Received in revised form 10 July 2008

Accepted 11 July 2008

#### Keywords:

Litter-bag

N immobilization

<sup>15</sup>N

Soil core

### ABSTRACT

In a pear orchard, when leaf senescence occurs, nitrogen (N) is added to the soil by the fallen leaves and can be re-used by the tree after undergoing decomposition and mineralization processes. Studies on leaf decomposition and N mineralization in orchards are scarce but essential to understand the N balance in the tree–soil ecosystem in a sustainable or precision agriculture. This study aimed to quantify the contribution of pear tree senescent leaves to N cycling in the orchard and its re-cycling by the crop. ‘Rocha’ pear unlabelled leaves were incubated *in situ* using the litter-bag technique and <sup>15</sup>N-enriched leaves were placed at the soil surface in undisturbed confined cores.

One- to six-year-old pear trees returned to the soil between 1 kg N ha<sup>-1</sup> year<sup>-1</sup> and 6 kg N ha<sup>-1</sup> year<sup>-1</sup> from senescent leaves that decomposed at rates varying from 0.0025 day<sup>-1</sup> (d<sup>-1</sup>) to 0.0047 d<sup>-1</sup> (estimated by both techniques, respectively). In the litter-bags, after 506–641 days, only 18–35% of initial DW was recovered in the soil, whereas in the soil cores the weight loss was higher, resulting in only 30–6% of initial DW after 398–406 d. After this period, between 36% and 110% of the initial N of the senescent leaves was recovered as organic <sup>15</sup>N in the surface soil layer (0–7.5 cm), depending on climatic conditions, and being more prone to be absorbed by weeds.

© 2008 Elsevier B.V. All rights reserved.

\* Corresponding author at: L-INIA, Quinta do Marquês, Av. República, 2784-505 Oeiras, Portugal. Tel.: +351 916847479; fax: +351 302011165.  
E-mail address: [claudia.bneto@sapo.pt](mailto:claudia.bneto@sapo.pt) (C. Neto).