

# SEQUESTRATION OF C IN SOME DECIDUOUS FORESTS OF WESTERN IBERIAN PENINSULA

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One of the most important balances in nature is that of carbon because since it determines the flow of organic matter it also governs that of other bioelements (N, P, S, etc). Recently there has been increasing concern about how to avoid the change in climate (whose direction is currently supposed to drive to an increase of the global temperature) fixing C in soils and biomass (which might affect bioelement cycles, particularly the C cycle) since this diminishes the content of CO<sub>2</sub> in the atmosphere. The objective of this work is to quantify the C sequestration in some oak forests located in the 'Sierra de Gata' Mountains (Central-Western Spain). A rainfall transect along the north edge of the 'Sierra de Gata' mountains (province of Salamanca, central-western Spain), with a slight gradual increase in temperature and a significant decrease in rainfall, was selected. This section of the territory is located between the municipalities of Navasfr'as (NF: 960 m a.s.l.; mean annual temperature 10.4 °C; mean annual precipitation, 1580 mm a<sup>-1</sup>), almost at the summit of the range (to the south) and Fuenteguinaldo (FG: 870 m a.s.l.; mean annual temperature 12.9 °C; mean annual precipitation, 720 mm a<sup>-1</sup>) on the Salamancan peniplain (to the north). Villasrubias (VR) is located in an intermediate situation. The climate of the site is sub-humid Mediterranean (the length of the summer drought being about two months) and the soils are mostly *haplic Umbrisols*, according to the F.A.O. system. The forest is an autochthonous, deciduous oak (*Quercus pyrenaica*) coppice with low anthropical influence over the last 30 years.

The annual inputs of C to the ecosystem with precipitation were 69, 63, and 61 kg C ha<sup>-1</sup> a<sup>-1</sup> at NF, VR, and FG, respectively. C fixed during the growth of trunks was calculated to be 2.3, 1.8, and 3.8 Mg C ha<sup>-1</sup> a<sup>-1</sup> at NF, VR, and FG, respectively. The accumulation of C in the tree biomass is 65, 64, and 98 Mg C ha<sup>-1</sup> a<sup>-1</sup>.

It was calculated that the litter decomposition constants were 0.33, 0.33, and 0.47 a<sup>-1</sup> at NF, VR, and FG, respectively. Since the annual productions of C at NF, VR, and FG are 2.60, 2.83, and 4.09 Mg C ha<sup>-1</sup> a<sup>-1</sup> (proportional to the growth of trunks), annual releases of C into the atmosphere are 0.86, 0.93, and 1.9 Mg C ha<sup>-1</sup> a<sup>-1</sup>, respectively. The accumulation of C in the Ah horizons is 103, 66, and 47 Mg C ha<sup>-1</sup> in NF, VR, and FG, respectively. The losses of C caused by deep drainage are 44, 57, and 23 kg C ha<sup>-1</sup> a<sup>-1</sup> at NF, VR, and FG, respectively. In addition, a loss of C by surface runoff (calculated in the catchment of NF, of 20 ha surface) of 44 g C ha<sup>-1</sup> a<sup>-1</sup> should be added.

On calculating a global balance, it is apparent that the inputs of C into these forest ecosystems are always greater than the outputs, the excesses being 1.5, 0.9, and 2.0 Mg C ha<sup>-1</sup> a<sup>-1</sup> at NF, VR, and FG, respectively (if the loss of C by surface runoff is considered negligible). The difference between FG and NF was 1.8 Mg C ha<sup>-1</sup> a<sup>-1</sup> of CO<sub>2</sub> (equivalent to 0.5 Mg C ha<sup>-1</sup> a<sup>-1</sup>).

**Keyword:** Western Spain, C sequestration, Deciduous oak forests, Soil organic matter, *Quercus pyrenaica*, Runoff.

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