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Preliminary results on the effects of afforestation of maize soils with *Populus alba* L., on carbon metabolism

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Transformation of a natural soil to agricultural land is generally assumed to be accompanied by increased mineralization of the organic matter and increased CO_2emissions; in contrast, afforestation of agricultural soil is thought to lead to sequestration of carbon and incorporation of atmospheric CO_2 into the organic matter. In other words the type of management and land use determine whether soils act as carbon sinks or sources, so that transformation of agricultural land to forest land is generally considered to be accompanied by an increase in edaphic carbon, although it is not clear whether this effect is always produced or if it depends on the agricultural history of the land being afforested.

In light of the recognised importance of forest land in sequestering C, and therefore in regulating climate change, in 1992 the EU established Regulation 2080 to promote the afforestation of marginal agricultural land. This had strong repercussions in regions such as Galicia (NW Spain) as the afforestation was mainly applied to good quality agricultural land rather than to marginal land. Although, as a result, large areas of agricultural land have been afforested in Galicia, the associated effects on edaphic carbon have not been widely investigated. The present study involves analysis of large number of afforested soils, planted with different trees and located in different areas throughout Galicia (NW Spain), with the aim of investigating the effects on carbon metabolism in agricultural soils transformed for forestry use.

Here we report the preliminary results concerning the observed effects on carbon metabolism in six soils afforested with poplar, *Populus alba* L., of age between 4 and 8 years. In addition to the six soils planted with poplars, adjacent agricultural soils (x6) were analyzed. In each case the adjacent soil was the same as the original soil prior to afforestation, and all were maize soils. Samples of the soils were collected in autumn, after harvesting and before any other agricultural activities were carried out. Samples were collected from the upper 10 cm of soil and were analysed for total carbon and nitrogen, basal respiration, microbial biomass C and labile C content (extractable with potassium sulphate); the metabolic coefficient (qCO_2), or in other words the quantity of C-CO_2evolved per unit of microbial biomass C, was also calculated. The main general properties of the soils were determined, along with the apparent density, to enable the results to be expressed per unit of weight and per unit of volume.

The results show that afforestation generally had little effect on the soil properties. Thus, comparison of the mean values obtained for afforested soils with the mean values obtained for agricultural soils revealed that, independently of whether the results were expressed per unit of weight or per unit of volume, the total C and N contents were slightly higher in the afforested soils; the same was also found for basal respiration and qCO_2, whereas the microbial biomass C and labile C contents were very similar in both types of soils. The variations were not significant in any case. Furthermore, exactly the same patterns were observed when the respiration, microbial biomass C and labile C values were expressed relative to the total C or N contents of the soils.

The scant modification of carbon metabolism may be attributed to the short time since afforestation, as well as to work carried out when the trees were planted.

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