



# 1 Coal particles in agricultural soils: quantification, characterisation and significance

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Coal is a potential contributor to the stable pool of soil organic matter through the chemical recalcitrance pathway. Open questions are concerning the nature of this organic matter type as well as its quantitative contribution to soils and its spatial variability with regards to different land use. The objective of this study was to isolate coal particles from two soils under different management (bare fallow and continuous cultivation), to study their morphology, their quantitative contribution and their elemental and isotopic composition. The two sites (42 Parcelles et Closeaux) are long-term experimental fields established by INRA at the parc of the Château de Versailles. Chemical and physical parameters of these soils are well-known. They were sampled in triplicate and black non-native particles of the  $> 2$  mm fraction were isolated visually and analysed.

The results show that the 78 black particles can be classified into four morphological groups. Coal particles are characterised by carbon contents of more than  $700 \text{ g kg}^{-1}$ . The carbon content of the coal particles isolated from the two soils is remarkably similar as well as their stable carbon isotope ratio that is on average  $-23.5 \text{ ‰}$ , at the two sites. The C/N ratio, wider than C/N of plant material, varies in coal particles between 38 and 130. Lower C/N ratios are recorded for coal particles at the bare fallow site. Along with a lower abundance of these particles compared with the site under continuous cultivation, this observation leads us to the hypothesis that degradation of

coal may have occurred at the bare fallow site. Further studies will therefore address the chemical composition of the coal particles in order to explain the differences in abundance and elemental composition at the two sites.