Geophysical Research Abstracts, Vol. 8, 02956, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02956

Decomposition and stabilization of ^{15}N labeled mustard litter (*Sinapis alba*) in physical soil fractions in an agricultural cropland with high and low yield areas

A. Koelbl, M. v. Luetzow and I. Koegel-Knabner

Lehrstuhl für Bodenkunde, Department für Ökologie, Technische Universität München, D-85350 Freising-Weihenstephan

High yield (HY) areas of an agricultural cropland were characterized by different positions on a slope and lower silt and clay contents, compared to low yield (LY) areas. This was associated with differences in water regime and C and N turnover. To understand differences in N flows and N stabilization of HY and LY areas, a combination of ^{15}N tracer techniques and physical fractionation procedures was applied. Within 570 days after application of ^{15}N labeled mustard litter, the distribution of ^{15}N was measured in particulate organic matter (POM) fractions and in fine mineral fractions (fine silt- and clay-sized fractions). After 570 days, only 2.5% of the initial ^{15}N amount was found in POM fractions, with higher amounts in POM occluded in aggregates than in free POM. After this period, stabilisation of the initial ^{15}N in fine silt- and clay-sized fractions amounts to 10% in HY, but 20% in LY soils. 70% to 85% of the added ^{15}N were lost.

^{15}N amounts and concentrations in mineral-associated fractions increased within 160 days after application. From 160 to 570 days, HY and LY areas showed different ^{15}N dynamics, resulting in a decline of ^{15}N amounts in HY, but constant ^{15}N amounts in LY soils. This means that fine mineral fractions still show significant differences between the sites after two years. Higher ^{15}N amounts in fine mineral fractions of LY soils indicate a better stabilisation of the mustard-derived N, maybe due to a slower N accumulation rate of this pool. Higher silt and clay contents of LY areas seem to promote N stabilisation in fine mineral fractions. For HY areas, a higher release of N in combination with lower storage of the added N in fine mineral fractions leads to better N availability for plant growth, but may also lead to the risk of higher N losses

due to leaching or denitrification processes. This is of particular importance if litter (or green manure) is applied in autumn and winter months, leading to unbalanced N release and N demand by plants.