

Impact of clearcutting on organic matter distribution and spatial occurence of litter decay in a Douglas stand (Beaujolais, France)

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 Follow the temporal variability of Litter inputs, Soil Organic Carbon (C_{org}), and Nitrogen (N_{org}) stocks Quantify the variability of these parameters in a recently clear cut forest stand

Role of a common forest practice on the spatio-temporal variability of Soil Organic matter Stock at the stand scale

Study site





CP=Clearcut Stand

Soil characteristics

brown acid soil/ Dystric Cambisol

humus-rich layer of the "Dysmull" or "Moder" types

Study site: history



Stand before clearcutting







Plantation of a new Douglas generation April 1999 – 6 months Stand after clearcutting November 1998 – 0 month



Invasion with secondary vegetation May 1999 – 10 months

Strategy for Soil and Litter Sampling

Clearcutting Parcel





300 m² – **32** Sampling points



Soil sampling



Spatial heterogeneity and statistical procedures

Differential Maps of C, N soil, litter stocks



Temporal variations of Litter stocks



Differential Maps of coarse litter stocks at 3 different sampling dates



- ⇒Relative trend to a decrease in coarse litter stocks after 10, 19 and 24 months
 ⇒Distribution into two areas:
- •A Northern area with coarse litter stock decrease
- •A Southern area with coarse litter stock accumulation
- ⇒Persistence of the spatio-temporal variability during the experiment

Differential Maps of fine litter stocks at 3 different sampling dates



Temporal evolution of Soil carbon and nitrogen content and stocks



Differential Maps of OC stocks of 0-5 cm layer at 3 different sampling dates



Differential Maps of ON stocks of 0-5 cm layer at 3 different sampling dates



ON stocks exhibited a similar behavior than OC stocks with a lower contrast of spatio-temporal variability

Microbial activity reduced the spatiotemporal variabilities of ON stocks observed for the OC Stocks

Conclusions

⇒ Spatio-temporal variability of fine litter has an impact in the soil organic matter distribution of the surficial mineral soils especially at short term

⇒Natural litter and soil organic matter distribution seems to be controlled by the microand macro-topography of the forest stand

⇒The clearcutting has many consequences on the soil organic Matter variations due to forestry practices:

• Heterogeneous distribution of fine litter at the mineral soil surface after a clearcutting may induce a higher spatial variabilities in soil organic matter

• Soil disturbances during the clearcutting such as vehicles tracks may enhance mineralization and incorporation of litter organic rests into the mineral top soil surface, at short term.

⇒ Disturbances induced by forestry practices disappear after one year following invasion of the secondary vegetation

Thank You for your attention