# Impact of logging residue management and wood ash fertilization on forest soil-plant interface biology: a microcosm study

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**Abstract**

In the context of energetic transition, an increase in woody biomass export is one of the investigated solutions for Bioenergy. Among solutions, export of logging residue with a diameter smaller than 7 cm, currently discarded on the forest floor, was investigated. To compensate organic matter losses due to harvesting, mineral fertilization by wood ash was proposed. Nevertheless, impacts of increased organic matter export and/or fertilization by wood ash in temperate forest are still scarcely studied. Our study in forest-soil microcosms investigated the response of soil communities to an export of organic matter and ash compensation on two soil types (acidic soil and basic soil). Four soil-interface biological groups were studied: Lumbricidae, collembola, vesiculo-arbuscular mycorrhizal fungal community, and grass species. In each microcosm, five experimental amendments were set up following a gradient of organic matter content: i) control (100Residue), ii) 70% of logging Residue and 30% of Ash (70R30A) iii) 30% of logging Residue and 70% of Ash (30R70A), iv) 100% of Ash (100A) and v) no amendment (R-). Each group was surveyed at three time points after the setting up of experiment (at one, four and twenty weeks).There were significant responses after twenty weeks. Earthworms biomass only increased in 100A amendment regardless of soil fertility. In basic soil, collembola abundance did not show any variation between 100R, 100A and R- but a decrease of 50% was observed for 70R30A and 30R70A mixed amendments. For acidic soil, collembola abundance was higher in 100R than in other amendments. Vesiculo-arbuscular mycorrhizal fungal community and grass epigeic growth exhibited the same pattern of response than collembola abundance. These various responses by soil types can be explained by pH modification due to ash application that are more important in acidic than in basic soil. Mineral fertilizations need to be modulated by soil characteristics.

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