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## **Soil compaction on two sensitive sites in north-eastern France and natural or assisted recovery processes**

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Soil compaction and rutting have become more recurrent since the increase in mechanization of forest operations. Compacted soils in general display disturbed functioning, in particular with regards to rooting, and water and air transfer. Yet we lack data to assess soil recovery rates and the factors influencing them. Two sites were set up in Lorraine on fine textured and acidic soils, to assess the short- to long-term impacts of forwarder traffic. Two mechanical (disking and local subsoiling called potet) and one chemical (soil liming) techniques to improve soil recovery rates were also tested.

Slight rutting and soil compaction resulted in more intense surface waterlogging whereas the deep soil layers remained drier than in the undisturbed plots. Even if we observed a beginning of natural soil structure recovery in the surface layers four to five years after compaction, it was not sufficient to decrease the impacts on soil water transfer and resistance to penetration. Mechanical improvement in soil structure depended on site conditions. Soil liming effects on soil structure were not visible in the short term, but its promising effect on soil water quality and sessile oak growth may change this trend. These results stress out that i- even slight rutting can create adverse soil conditions for tree regeneration and growth, ii- natural regeneration following soil compaction is slow and the question of the recovery of medium-depth soil layers has to be considered, and iii- techniques to improve recovery rates should involve at least improvement of soil drainage over 50cm depth.