

عنوان مقاله:

Influence of machine type, traffic intensity, and travel speed on selected soil physical properties during skidding operations

محل انتشار:

مجله علوم زیستی خاورمیانه، دوره 22، شماره 3 (سال: 1403)

تعداد صفحات اصل مقاله: 14

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خلاصه مقاله:

Among the various factors affecting soil compression during wood extraction, travel speed hasn't received much attention. The aims of this study were to (a) assess the effects of two frequently employed wood extraction machines, namely a tractor (Massey Ferguson 285) and a skidder model (Timberjack 450C), equipped with different tire sizes and uneven axle loads with regard to forest soil physical properties and rut formation under various traffic frequencies and travel speeds, and (b) examine the relationship between travel speed and soil bulk density. Treatments included six different traffic frequencies (1, 2, 3, 4, 5 and 6 passes) and three travel speed levels (1, 2 and 3 m s<sup>-1</sup>) of the two tractors. The number of passes, machine type, and travel speed all show significant effects ( $p < 0.05$ ) on bulk density, total porosity, and rut depth. The skidder exerted statistically significant. Bulk density positively correlated with traffic intensity in all examined levels of travel speed. Porosity in the topsoil (0-10 cm) decreased by an elevating number of passes and this trend was also evidenced as the travel speed decreased. Furthermore, the skidder created, in all cases, deeper ruts than those generated by the tractor. Considering the imminent end of the ban on wood harvesting in the study area in 2016, these insights have practical implications for forest management and wood extraction practices. Forest managers should carefully consider the choice of wood extraction equipment and operational parameters, especially travel speed, to minimize soil compaction and rut formation. The implementation of strategies that support sustainable soil management practices during the wood extraction are paramount to preserving the long-term health and productivity of forest ecosystems.

کلمات کلیدی:

soil compaction, porosity, Rut depth, skidder, Tractor

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