

Soil disturbance from different mechanised harvesting in Hill Tropical Forest, Peninsular Malaysia.

ABSTRACT

The impacts of mechanised forest harvesting to soil physical properties are the major concern by forest managers, which have the potential to impact soil sustainability and forest productivity. Malaysia is practicing reduce impact logging (RIL) and applying code of forest harvest practice in forest harvesting and operations for sustainable forest resources management. In 2001, a machinery called Rimbaka Timber Harvester R2020-A was introduced for timber extraction for peat swamp forest and later on the machine was introduced to the hill tropical forest as an alternative to other machines. The study aimed to evaluate soil compaction (soil cone index, soil bulk density, soil moisture content and soil pore space) by Rimbaka Timber Harvester R2020-A and crawler tractor KOMATSU D60-A. A total of five samples were randomly taken using core sampler of 50 mm height and 50 mm diameter at the beneath a lug imprint for passes 1, 4 and 8. Altogether samples were 45. The locations of sample were to the right and left of each rut centre for both machines. Treatment effects were evaluated using analysis of variance (ANOVA). Result showed that compaction by Rimbaka machine was increased bulk density from 1.14 to 1.43 g/cc, cone index from 1.94 to 3.45 g/cm³ decreased total pore space by 43% and decreased soil moisture content by 19%. Meanwhile compaction by KOMATSU D60-A was increased bulk density from 1.2 to 1.43 g/cc, cone index from 1.24 to 1.94 g/cm³ decreased soil moisture content by 11% and total pore space by 6%, respectively. The value increased rapidly as more passes increase on the track surface. The higher soil disturbance by Rimbaka machine was due to physical design and specification of the machine. This study also observed that there was significant difference in the total passes of machinery used in harvesting operation. Although Rimbaka machine is showing more effected to soil compaction, the machine is a practical alternative to avoid skid trail and reduce road density in forest area.

Keyword: Soil disturbance; Bulk density; Cone index; Pore space; Harvesting operation; Rimbaka harvester system; Crawler tractor