

Risk of soil damages cause by logging and hauling technologies employment during Kyrill windbreak processing

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Abstract

The hurricane Kyrill didn't damage only stands in the Czech Republic, but in all of Europe within the days from 18th to 19th January 2007. The wind power was more than 40 m/s (in the extreme 53 – 60 m/s). The wind has damaged a lot of state and private stands, where areas of windbreaks and individual windfalls were. There are new fears of possible impacts, which can occur there now. It is especially soil damage caused by forest mechanizations and water erosion. These troubles can spring up after unacceptable use of logging and hauling technologies. The risk of soil damage is analyzed in the military stands (Division Horní Planá), where c. 250.000 cubic meters of wood were processed after the calamity.

For the logging and hauling operations were used these machines: the wheel-harvester Timberjack 1270B; the tracked-harvester Timberjack 2628; the forwarders Timberjack 1110 and Timberjack 1410. John Deer 1490D was used for the quick liquidation of logging residues. A part of the forest area was renovated by the excavator MenziMuck.

The biggest mechanical soil damages were in the south-east parts of sample plot, where the beaten tracks with depth over 26 cm had the highest share (to 58 %). High soil waste dumps have sprung up here and water has stood in the tracks because of the soil saturation. Lines, that had beaten tracks from 16 to 25 cm, had the share of 17 %. The share of 13 % had the tracks with the depths from 8 to 15 cm and the share of 12 % had the beaten tracks to the 7 cm. In the northern part, where the slope was over 10 %, were smaller mechanical soil damages. Stone soil ground was on steep land there, the skidding lanes were marked vertical and the distance of skidding lanes was c. 15 - 20 m. The results show, that the highest representation of the depth of tracks was up to 7 cm (88 %) and the interval of the tracks was from 8 to 15 cm (the representation of 12 %).

The soil compression was maximal in beaten tracks of the machines, which is depending on the depth of a measurement from 0.06 to 2.71 MPa. The highest relative increase of the unit draft was on the top bed of the soil ground from 4 to 8 cm. The unit draft increased about 43 - 63 % in the beaten tracks. The stabilization was at a depth of 40 cm, where we can not confirm the difference between damaged and undamaged soil. The soil zone was softened in wheel track by the side pressure of the wheels. The unit draft was lower about 16 - 64 % in comparison with undamaged soil ground. The next results show the differentiation of the unit draft versus soil moisture, which was differenced to 3 intervals from 25 to 100 % of the volumetric soil water. The results confirmed also lower consolidation of the soil ground, where brushwood was on the skidding lines. The difference of the unit draft was lower about 0.1 – 0.3 MPa. The relative difference was in the interval from 0 to 33 %.

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