SMALL WOOD

December 2020

INFOSHEET

Environmental assessment of thinning with Bracke C16c

This study assessed the damages to remaining trees in Swedish, Finnish and Slovenian forest stands thinned with Bracke C16c Smallwood version following two different working methods: boom corridor (BC) and selective (S) thinnings. In addition, stump heights, soil damages and harvesting emissions were analyzed.

AIM OF THE STUDY

The aim of this study was to assess soil and tree damages in the remaining stands, and harvesting emissions from a life cycle perspective.

MATERIALS AND METHODS

The experimental design consisted in repeated study units of 50 m x 20 m (Figure 1) in the three countries. Trees with dbh ≥ 7cm were sampled throughout the strip roads after thinning and throughout 40 transects in Sweden, 24 transects in Finland, and 56 transects in Slovenia after forwarding.
Soil damages (rutting > 10 cm depth) along the strip roads and stump height of all the stumps with diameter > 1 cm within the transects were recorded.

Harvester fuel consumption was estimated by the engine management computer. Data was taken for each study unit. A Life cycle perspective was used to calculate the environmental impacts of the harvesting process.

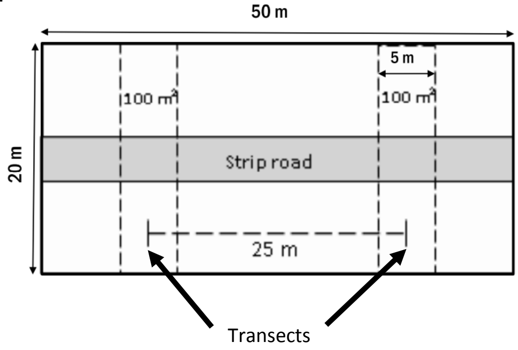

Figure 1. Study unit.

RESULTS

The number of damaged trees / 100 m. strip road after thinning and before forwarding was lower in boom corridor thinning than in selective thinning (Table 1). This difference between working methods was statistically significant. The analysis of damaged trees after forwarding did not show a significant difference. However, the average number of damaged trees was lower in boom corridor than in selective thinning in Finland and Slovenia, and similar for both working methods in Sweden (Table 2).

Table 1. Number of damaged trees / 100 m strip road after thinning. Values are average per study unit and working method with minimum and maximum values in brackets.

Working method	Number of damaged trees / 100 m strip road after thinning		
	Sweden	Finland	Slovenia
Boom C.	4.4 (0.0-12.3)	2.3 (0.0-6.0)	6.6 (2.0-16.0)
Selective	5.1 (2.0-8.1)	4.3 (0.0-14.0)	12.0 (6.0-20.0)

Table 2. Number of damaged trees / ha after forwarding. Values are average per study unit and working method with minimum and maximum values in brackets.

Working method	Number of damaged trees / ha after forwarding		
	Sweden	Finland	Slovenia
Boom C.	125.0 (50.0-150.0)	91.7 (50.0-200.0)	185.7 (0.0-350.0)
Selective	120.0 (0.0-250.0)	133.3 (50.0-300.0)	210.7 (50.0-400.0)

ForestValue

In Sweden and Finland most of the damages were "bark squeezed" at stem heights higher than 100 cm and smaller than 50 cm² for both working methods. In Slovenia most of the damages were "bark scratched" at stem height higher than 100 cm for both working methods, and smaller than 50 cm² in boom corridor thinning. Damages larger than 200 cm² were the most abundant damage size in selective thinning. The main damage cause was the harvester head movement for all countries and for both working methods.

Soil damages were lower than 8 m. / 100 m. strip road for both methods and in all countries.

The average stump height was around 26 cm in Finland and Slovenia and around 37 cm in Sweden, and slightly lower in selective thinning than in boom corridor thinning (Figure 2).

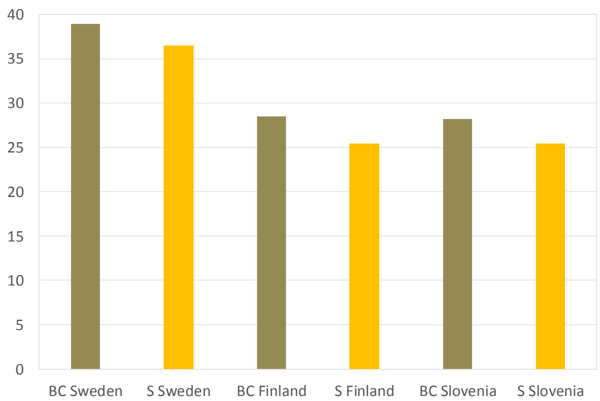

Figure 2. Average stump height per working method (cm).

The amount of diesel consumed during the harvesting process was lower in boom corridor thinning than in selective thinning in all countries. Therefore, the greenhouse gas emissions to the atmosphere were also lower in boom corridor thinning, although this difference was not statistically significant (Figure 3).

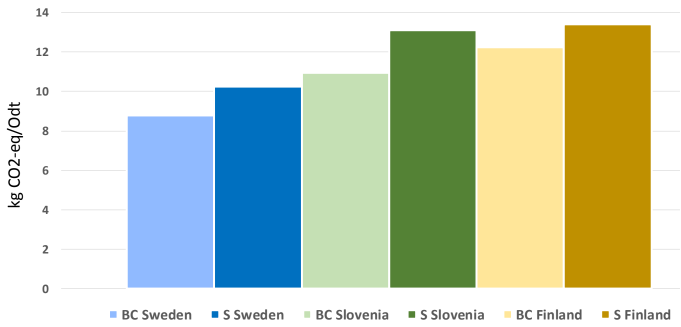

Figure 3. Average greenhouse gas emissions per oven dry tonne and working method.

CONCLUSION

Damages on soil, the average stump height, the tree damage characteristics and the main cause of tree damages were similar in both working methods.

The number of damaged trees observed after thinning was lower in boom corridor thinning than in selective thinning.

Although there was no statistical difference in emissions between the working methods, boom corridor thinning seems to be more energy efficient than selective thinning due to a lower time consumption, and therefore a lower fuel consumed.

AUTHORS

Teresa de la Fuente and Eduardo Tolosana

UPM

mariateresa.delafuente@upm.es

GOZDARSKI INŠTITUT SLOVENIJE SLOVENIAN FORESTRY INSTITUTE

Bracke FOREST

University of Maribor Faculty of Economics and Business

UNIVERSITY OF EASTERN FINLAND

Funded by the Horizon 2020 Framework Programme of the European Union

ForestValue