COMPARISON OF GROUND DISTURBANCE BETWEEN THE ELLETTARI STUMP DRILL AND A CONVENTIONAL STUMP HARVESTING HEAD ON PEAT LAND IN FINLAND

Harvesting stumps on peat land in the winter can be a way to make stump harvesting a year around work for the contractors. To use technologies that instead of uprooting the entire stump drill off only the center part of the stump could be a more environmental friendly option. The ground disturbance after harvesting of stumps with of a conventional stump harvesting head and a stump drill was studied. The results show that the conventional head give 10 times larger ground disturbance. This makes it doubtful to use conventional stump harvesting heads on peat land, but instead use the stump drill. There are however some technical problems with the stump drill that has to be solved for it to be used in practical harvest. Also the harvested volume per stump is reduced when only harvesting the center part of the stump, this effect on the economical outcome of stump harvesting also has to be studied further.

INTRODUCTION

Stump harvesting is today conducted during the snow free part of the year, which means that the contractors can't work the whole year with stump harvesting. This is of course a problem that makes stump harvesting less attractive for entrepreneurs. It is therefore interesting to investigate possibilities to prolong the stump harvesting season, which mean that stump harvesting would be conducted under winter conditions. That would however probably be difficult to do on mineral soils as the soil would be frozen and very difficult to remove from the stumps resulting in a low quality fuel.

Stumps from peat lands could be harvested under winter conditions and still give a fuel of high quality as the peat that sticks to the stumps is a good fuel. Peat lands also have a low bearing capacity so trees and stumps can only be harvested during the period when ground is frozen, otherwise there would be sever track-damages. The sensitivity of peat lands makes it questionable to use conventional stump harvesting heads even in winter conditions as it could reduce the bearing capacity to much (roots reinforcing the ground are removed). This mean that one has to look for harvesting techniques that can harvest the stump with a lower ground disturbance and that also leaves more of the side roots in the soil to keep the bearing capacity at an acceptable level.

Today stump drills are used in southern Europe for harvesting stumps in poplar plantation when clones are changed. This is a equipment that could possibly be used to harvest stumps on peat land under winter conditions.

Figure 1. The Ellettari stump drill.

The pine stumps from peat lands are also an interesting feedstock for future biorefineriessince it has the highest content of extractives in Nordic conditions. For stump harvesting to be conducted on peat lands in winter conditions both the ground disturbance of different techniques and the machines productivity has to be investigated. This study investigates the ground disturbance.

METHOD

A studiy was conducted on a peat land near Lappajärvi in Finland. The ground disturbance of a conventional stump harvesting head was compared to the ground disturbance of the Ellettari stump drill. Stumps was lifted in April-May 2013 and the holes was measured in October 2013. The holes after the conventional stump harvest were measured by putting a net over the hole and counting all squares more than 50 % affected. The holes after the stump drill were measured by a folding role. Also the depth was measured of all holes.

RESULTS AND DISCUSSION

The holes from the stump drill were about 10 times smaller than the holes of the conventional stump harvesting head, but the depth of the holes was similar for the two harvesting heads (Table 1 and Figure 2).

The difference between the ground disturbance for the two harvesting heads are significant which makes it doubtful to use the conventional harvesting technique on peat land. In this study it was not possible to make a comparison of the productivity of the two harvesting heads as the stump drill had some technique problems. Also the harvested volume per stump will be lower. Further studies and of the systems ecomony has to be done to see which system gives the highest profit The stump holes will also be measured next summer to study the development of stump holes over time.

KEYWORDS

Stumps, ground disturbance, peat land.

Figure 2. Stump holes, a conventional stump hole during measurement of its area (above) and a hole from the stump drill

Table 1. Hole size and depth for the two harvesting heads in the study

Harvesting head	Hole size (m^2)	Hole depth (cm)
Conventional	9.0	36.4
Stump drill	0.9	39.3

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1.11.2013

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