



EVALUATION OF THE DONAREN 180D POWERED-DISC TRENCHER IN CENTRAL NEWFOUNDLAND, AND A COMPARISON WITH THE SILVA WADELL POWERED-CONE SCARIFIER

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This Field Note summarizes FERIC Special Report SR-88, "Evaluation of the Donaren 180D powered-disc trencher in central Newfoundland, and a comparison with the Silva Wadell powered-cone scarifier" by S.W.J. Dominy. Copies of SR-88, which was funded under the Canada-Newfoundland Cooperation Agreement for Forestry Development, are available from FERIC on request only.

INTRODUCTION

The objective of this study was to compare the results obtained with a Donaren 180D powered-disc trencher, operating in both heavy *Kalmia angustifolia* and difficult slash in central Newfoundland, with the results of a previous FERIC trial (Dominy 1993) of the Silva Wadell powered-cone scarifier under similar conditions. In the latter trial, the Silva Wadell had produced better-quality plantable microsites than a TTS-35 disc trencher. However, the relatively flat-bottomed shape of the furrow produced by the cone scarifier may not be suitable on all sites, especially those with a high water table.

In the present study, the Donaren 180D was mounted on a Timberjack 450B wheeled skidder with a 118-kW net power rating. The maximum disc rotation speed, a down-pressure of about 20 bars (normal for stony conditions), and a 2-m spacing were used. Two treatments on each site were compared, based on normal (71 m/min) and slower (37 m/min) travel speeds.

SITES

Sites were chosen to replicate the heavy *Kalmia* and *Difficult Slash* sites in the previous study as closely as possible, but the sites were not identical (Table 1). The Donaren sites

Table 1. Site characteristics

Site/study	Total slash volume (m ³ /ha)	Avg no. stumps/ha	LFH ^a thickness (cm)	Stoniness (%)
<i>Kalmia</i>				
- Donaren	42	3208	12.1	90
- Silva Wadell	43	1647	10.2	77
<i>Difficult Slash</i>				
- Donaren	92	3395	13.6	100
- Silva Wadell	71	2648	10.5	71

^a The thickness of the duff layer.

had more stumps and stones and thicker duff, as well as more slash on the *Difficult Slash* site.

RESULTS AND DISCUSSION

Donaren 180D Study

The travel speed of the Donaren had no significant effect on furrow depth and width or on berm height and width on either site. However, the slow travel speed on the *Difficult Slash* site provided a greater percentage of preferred plantable spots.

On the *Kalmia* site, both furrow width and the amount of mixed soil in the furrow decreased as *Kalmia* cover increased. The results indicated that the discs were unable to overturn as much of the root mat in the presence of heavy *Kalmia* cover. On the *Difficult Slash* site, the amount of mixed soil decreased as duff thickness increased. Also, irrespective of the presence of slash, thick duff increased

the occurrence of disturbed-duff microsites in the furrow, and decreased the amount of exposed mineral soil.

Comparison of Donaren 180D and Silva Wadell Results

For central Newfoundland, the important questions addressed by this comparative study related to the effectiveness of the equipment in (1) reducing the encroachment of *Kalmia*, and (2) parting the slash cover to increase the plantable area. Unfortunately, the site conditions were not identical in both studies, which confounded the results. Nevertheless, some valuable observations can be made.

In comparison with the most effective settings for the Silva Wadell on similar sites, furrow width was 11 to 14 cm less for the Donaren treatments on the *Kalmia* site and 7 cm less on the *Difficult Slash* site. The Donaren produced a lower percentage of preferred plantable spots than the Silva Wadell on the *Difficult Slash* site (Table 2), but the results were comparable on the *Kalmia* site. The most common reason for marginal planting spots on both sites in the present study was thick duff. The high degree of stoniness most likely caused the Donaren disc's teeth to scrape away the surface slash and some duff, but not the entire duff layer (as would have been the case with deeper disc penetration).

Table 2. Comparison of plantable spots for the best scarifier treatments

Site/study	Preferred (%)	Marginal (%)	Total plantable (%)
<i>Kalmia</i>			
- Donaren	95	3	98
- Silva Wadell	96	4	100
<i>Difficult Slash</i>			
- Donaren	77	15	92
- Silva Wadell	88	12	100

Perhaps a more important consideration when comparing the two implements is the shape of the furrow. The Donaren produces a sloping furrow bottom that rises gradually to the hinge position, which is usually the preferred planting microsite. This spot is the area farthest from competing vegetation and consists of loosened soil that will not become oversaturated. Conversely, the more flat-bottomed furrow created by the Silva Wadell on the sites

examined offers only the furrow bottom as a suitable planting spot on most sites, and the bottom can become water-saturated on poorly drained sites. Although both a 7° and an 18° cone angle were used in the Silva Wadell study, there was little difference in furrow shape because of the restricted penetration on the stony central Newfoundland sites.

CONCLUSIONS

There were significant differences between the Donaren 180D and Silva Wadell treatments, with the Silva Wadell producing more preferred plantable microsites, particularly under difficult slash conditions. The differences appear to relate to the greater stoniness, higher stump density, and thicker duff on the Donaren sites. In wet soils, the trench and berm profile produced by the Donaren may be more suitable than that produced by the Silva Wadell. In stony, drier soils, the Silva Wadell may be a more appropriate implement owing to its greater ability to lift and displace the slash and the surface organic layer.

Choosing sites with identical conditions for a study of this nature is virtually impossible. Nevertheless, the results indicate that either scarifier may be an acceptable alternative on the sites examined. The final choice of implement may thus depend on other key local plantation establishment constraints, such as soil moisture conditions. Factors such as the complexity of the equipment, its cost, the available prime movers, etc. must also be considered. The use of a slash-parting rake mounted on the front of the skidder might also have improved the effectiveness of the scarifiers.

Follow-up plantation establishment studies in these areas will provide a final verdict on the appropriateness of the treatments under the site conditions evaluated. Such studies are being conducted by local government agencies.

REFERENCE

Dominy, S.W.J. 1993. A comparison of the Silva Wadell powered cone scarifier and TTS-35 disc trencher in central Newfoundland. For. Eng. Res. Inst. Can. (FERIC), Pointe-Claire, Que. Spec. Rep. SR-84. 15 p.

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