



COMPARITIVE TRIALS OF SITE REHABILITATION WITH THE CRABE FORESTRY HARROW AND THE MERI CRUSHER

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INTRODUCTION

In an effort to rehabilitate sites with an elevated water table, which had been invaded by alder, willows and grasses, Norbord Industries Inc. carried out comparative trials of the Crabe forestry harrow and the Meri crusher. The trials were conducted with FERIC's assistance near Senneterre in the Abitibi region of Quebec. The goal of the study was to test a new technique by comparing it with a technique already established in the region.

Treatment of sites with the Crabe disc harrow is a proven technique in the region (Cormier 1990). This implement performs partial comminution of the vegetation and incorporates organic material more-or-less uniformly into the soil. Compared with the harrow, the Meri crusher mulches vegetation more finely and creates a more uniform mixing of the organic matter with the upper mineral-soil horizons. The relative operating costs of the two implements and the treatment quality they provided served as the comparison criteria.

STUDY CONDITIONS

The harrowing operation consisted of two passes, with the second pass perpendicular to the first; the first pass broke down the vegetation and opened up the soil, and the second pass completed the comminution and inverted the soil. Each pass covered a width of about 4 m. During the trials, two harrows with 90-cm discs pulled by a Dresser TD20 bulldozer and a Caterpillar 528 skidder were used (Figure 1). However, the productivity was only assessed for the harrow pulled by the skidder.

Mulching was performed by a 2.5-m-wide Meri MJS-2.5 crusher equipped with a push frame and a rear drum to knock down the vegetation (Figure 2). In contrast with other devices of this type, which are generally used for brushcutting, the 95 mining bits on the Meri permit soil treatment down into the upper soil horizons. The crusher was mounted on the PTO of a four-wheel-drive, 82-kW

Massey Ferguson 6180 tractor. For this work, the tractor was specially equipped with underbelly protection and a transmission with creeping gear speeds.

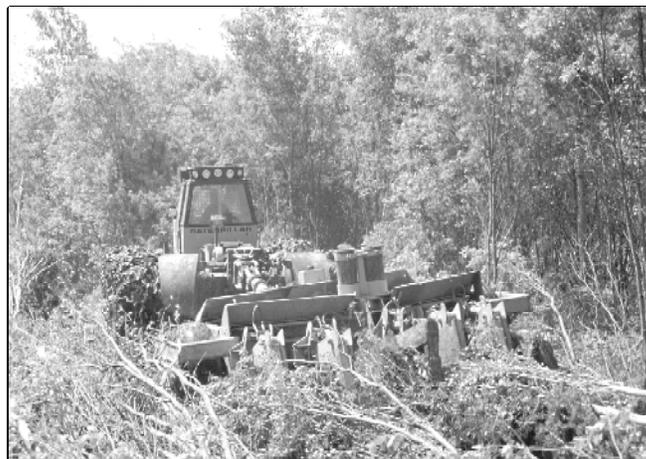


Figure 1. The Crabe forestry harrow mounted on a Caterpillar 528 skidder.



Figure 2. The Meri MJS-2.5 crusher mounted on the PTO of a Massey Ferguson 6180 tractor.

The trials took place north of Senneterre during June and July 1996, on sites that had been harvested in 1972. The sites were flat, with a thin humus layer, and had been invaded by dense vegetation (18 000 to 25 000 stems/ha) that was about 2 to 3 m tall; more than 93% of the vegetation was composed of alders and willows. The work performed by the Crabe and the Meri was compared on two sites with moderate drainage. Data were also gathered for sites with poor drainage that were treated by the Meri crusher.

RESULTS

Time trials were conducted to compare the productivities of the two machines. On the site with moderate drainage, the Crabe harrow performed site preparation at an average rate of 50 m/min during its first pass and 48 m/min during its second pass. The harrow's average productivity was thus just under 0.58 ha per effective machine hour (EMH; excluding delays and turnaround time), for an estimated operating cost of around \$350/ha. Mulching with the Meri crusher was much slower, based on the measured rate of 10.7 m/min on the site with moderate drainage and 8.3 m/min on the site with poor drainage. The resul-

tant productivities for the two sites were 0.16 and 0.13 ha/EMH, respectively, at estimated costs of about \$750 and \$900 per hectare.

The treatments were evaluated in terms of the microsite quality and, based on visual estimates of the treated surface, in terms of the level of incorporation of organic matter into the mineral soil (Table 1). There were large differences between the two treatments. The Meri had a greater tendency to produce uniform mixing of the soil and fine mulching of the vegetation, whereas the soil inversion produced by the harrow's discs produced more of a coarse mixing action or an exposed or inverted mineral-soil layer, as well as coarse mulching of the vegetation. In addition, the Meri also produced better results in terms of plantability and incorporation of the organic matter into the soil.

CONCLUSIONS

Compared with the Crabe forestry harrow, the implement usually used in the Abitibi region for site rehabilitation, the Meri crusher proved to be considerably less productive and very expensive to operate. However, it also produced much better treatment quality.

The Meri crusher has not yet been used operationally for site preparation, and its productivity could improve as operators became more experienced and as a result of minor operational improvements and a better match between the implement and its carrier. However, it is unlikely that productivity could be increased above 0.2 ha/PMH while still producing uniform mixing and high-quality work, so operating costs would remain above \$500/ha.

In the final analysis, the comparison must account for the relative yield of the plantations that will be established after the two treatments and the tending costs that result from the use of the two techniques.

REFERENCE

Cormier, D. 1990. Evaluation of the Le Crabe forestry disc harrow. For. Eng. Res. Inst. Can. (FERIC), Pointe-Claire, Que. Technical Note TN-150. 6 p.

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Table 1. Description of the treatment results obtained with the Crabe forestry harrow and the Meri crusher

	Crabe forestry harrow	Meri MJS-2.5 crusher	
	Moderate drainage	Moderate drainage	Poor drainage
Disturbance class (%)			
Uniform mixing	8	58	40
Coarse mixing	17	0	0
Mineral soil inverted	16	0	1
Mineral soil exposed	17	1	3
Humus exposed	6	1	0
Fine mulching	2	30	38
Coarse mulching	34	10	16
None	0	0	2
Plantability (%)			
Good	4	89	89
Marginal	76	11	10
Nil	20	0	1
Extent of incorporation of organic matter (%)			
Good	4	84	90
Average	76	16	10
Nil	20	0	0