



THE BRÄCKE B290 PATCH SCARIFIER. PART 1: CONTROL OF MICROSITE QUALITY

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INTRODUCTION

The Bräcke B290 patch scarifier is a two-row variable-function scarifier. Compared with powered-disc or powered-cone scarifiers, which are more common in Canada, the mattock wheels of the B290 permit the creation of variable-length patches with a flat profile as well as raised microsities (mounds).

FERIC carried out a study with Stone-Consolidated Corporation (Fort Frances, Ontario) to determine the effectiveness of this new scarifier and to measure the effect of its variable settings on the microsities produced under different terrain conditions. The study also compared the treatment qualities obtained with the Bräcke B290 and a conventional Bräcke scarifier. The latter comparison is presented in Field Note Silviculture-90.

DESCRIPTION OF THE SCARIFIER AND THE SITES

The Bräcke B290 is designed to be mounted directly on its carrier; during the present study, it was mounted on an 82-kW Timberjack 1010 forwarder (Figure 1). The scarifier allows the operator to choose the type of patch created using an onboard computer that controls the action of the mattock wheels with respect to the distance traveled by the machine. By controlling the rotation and braking of the mattock wheels, the computer can control the length and depth of the patches as well as the type of mounds created at the end of each cycle (Figure 2). To facilitate the operator's work, the onboard computer offers five adjustable preprogrammed settings that correspond to desirable patch types for the most commonly encountered site conditions. The down-pressure exerted by the scarifier can also be adjusted to account for variable soil and obstacle conditions.

Two sites harvested with a full-tree system were selected to study the effectiveness of the scarifier's various settings. The five preprogrammed settings served as the basis for comparison. The two sites differed primarily in the stoniness of their soils (Table 1). Block 1 was rougher, with slopes ranging between 10 and 20%, whereas Block 2 was more uniform and flat.



Figure 1. The Bräcke B290 patch scarifier mounted on a Timberjack 1010 forwarder.

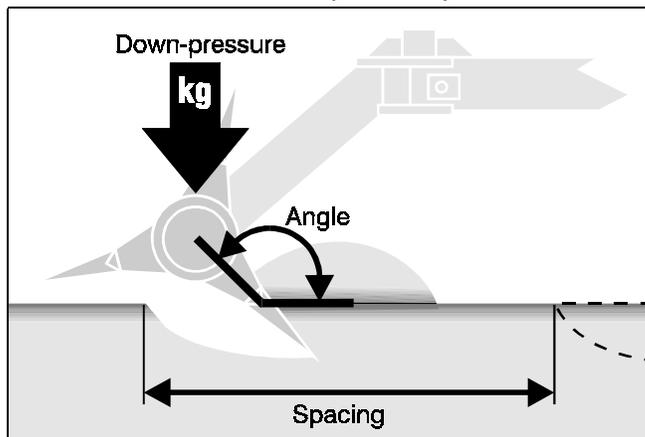


Figure 2. Diagram of the variable scarification produced by the Bräcke B290 mattock wheels as a function of down-pressure and the position at which mattock rotation is stopped (angle and distance).

RESULTS

Detailed time studies on the two sites gave a productivity of 0.69 ha/PMH in Block 1, versus 0.86 ha/PMH in Block 2. This difference was explained primarily by the greater number of personal delays in Block 1 and the fact that the

carrier was slightly undersized and experienced some difficulties in traversing slopes. The low productivity observed in both blocks can also be explained by the lack of operator experience. Fuel consumption averaged 18.2 L/hour.

Table 1. Ground conditions before scarification

	Block 1	Block 2
Slash		
Volume (m ³ /ha)	33	31
Coverage (%)	12	11
Stumps		
Density (no./ha)	1130	963
Diameter (cm)	21	24
Height (cm)	21	17
Humus depth (cm)	7	5
Stoniness (%)	86	14

Table 2 describes the characteristics of the patches created in the two blocks by the scarifier's five preprogrammed settings (mound 1, mound 2, debris, long, scalped). The mound settings are used to produce different sizes of elevated planting spots; the debris setting is used to create conventional patches under heavier debris conditions; and the elongated patch settings (long and scalped) are used to produce longer, shallow patches suitable for direct seeding. The scalped setting was mostly used in shallower soil.

The patches produced in the trials were long compared with those produced by a conventional Bräcke and most contained more than one plantable microsite. As a general rule, the densities and sizes of the patches were relatively similar in the two blocks for a given setting. However, the

angle of attack provided by the two mound settings (mound 1 and mound 2) helped the mattocks to penetrate the stoniness in Block 1 and thus provided comparable patch depth in both blocks. Conversely, the other settings (debris, long, scalped) provided only superficial treatments in Block 1, with little mineral soil exposure. The mounds formed in Block 2 were generally larger and firmer than those formed in Block 1 because the soil was deeper and less rocky.

Using the most effective setting for a given site permitted a potential increase in plantability on the order of 28% compared with the least effective setting. The difference in the results between the two sites is particularly striking because the setting that produced the worst plantability in Block 1 produced the best plantability in Block 2.

CONCLUSIONS

The variable functions of the Bräcke B290 patch scarifier increase its potential versatility. The device provided a reasonable level of productivity, but the results would have been better if the implement had been matched with a more powerful carrier.

This study indicated plantability differences of up to 28% depending on the setting chosen, and revealed high variability as a result of ground conditions. This demonstrates the implement's potential, but also suggests the importance of a judicious choice of settings for different site conditions.

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Table 2. Characteristics of the patches created on two types of terrain using the scarifier's five preprogrammed settings

Setting	Block 1					Block 2				
	Mound 1	Mound 2	Debris	Long	Scalped	Mound 1	Mound 2	Debris	Long	Scalped
Patches^a										
Density (no./ha)	1350	1188	688	763	863	1225	1113	838	675	888
Size (cm)										
- Total disturbed length	213	266	465	420	346	185	218	417	466	320
- Total disturbed width	67	59	42	41	35	53	52	53	54	46
- Depth	17	16	7	8	5	16	16	15	13	9
Distance between patches (cm)	371	421	727	656	580	408	449	597	711	563
Overall mineral soil exposure (%)	5.5	7.5	1.0	1.0	0.5	4.4	4.4	6.8	5.1	1.6
Mounds										
Size										
- Area (m ²)	0.58	0.53	0.46	0.52	0.20	0.80	0.92	1.03	1.19	0.48
- Height (cm)	18	15	17	18	10	17	17	26	17	13
Type (%)										
- Firm mound	65	51	9	47	14	85	84	73	44	26
- Sparse material	8	12	13	25	18	13	10	17	39	42
- Unstable scalp	27	37	78	28	68	2	6	10	17	32
Plantability (%) ^b	86	84	59	60	67	69	78	97	82	77

^a Patch parameters do not include the mound or inverted material.

^b Plantability is the ratio between the number of plantable microsities produced by the scarifier and the desired number of microsities.