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THE SPROUT-LESS HERBICIDE APPLICATOR

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INTRODUCTION

Aboud Mubareka, a forester and silvicultural contractor, developed a brush saw–mounted device called the Sprout-Less Herbicide Applicator that can be used to apply herbicide to the stump during cutting. Unlike other brush saw–mounted devices developed in Finland in the 1970s (the Windsor/Enso Stump Treater and the TT Brush Saw-mounted Stump Treater), the Sprout-Less applicator does not produce a spray; thus, it can potentially permit low herbicide-application rates. The device is rugged and simple to use, and it requires little or no modification of the brush saw. To date, models have been manufactured for most commonly used saws. In August 1998, FERIC conducted a short-term study of two operators using the device for plantation cleaning on Fraser Papers Inc.'s limits near Edmundston (N.B.).

TOOL DESCRIPTION

The Sprout-Less Herbicide Applicator (Figure 1) consists of a cup-shaped reservoir and a valve system that attaches beneath the brush saw's blade using the existing bolt and nut. It measures approximately 10 cm in diameter, holds 110 mL of herbicide solution, and weighs about 500 g when full. The reservoir was designed to be refilled via two small plugs when the operator refuels the brush saw. The applicator is activated by vibration of the saw's blade. A set of gaskets between the reservoir and the copper cap prevents the herbicide from seeping out until the vibration levels rise above a certain level (i.e., when cutting a stem); at that point, a gap forms between the cap and the reservoir and lets the herbicide solution seep out and spread across the bottom of the blade. Available gasket combinations can match the flow rate to a variety of herbicide mixtures of different viscosities. Gaskets must be replaced approximately every 12 refills, depending on the site and stand conditions and on how fast the gaskets become clogged with dirt or herbicide residues. In 1999, the Sprout-Less Herbicide Applicator cost $695 per unit, including five sets of gaskets. Gaskets cost $36 for 12 sets.

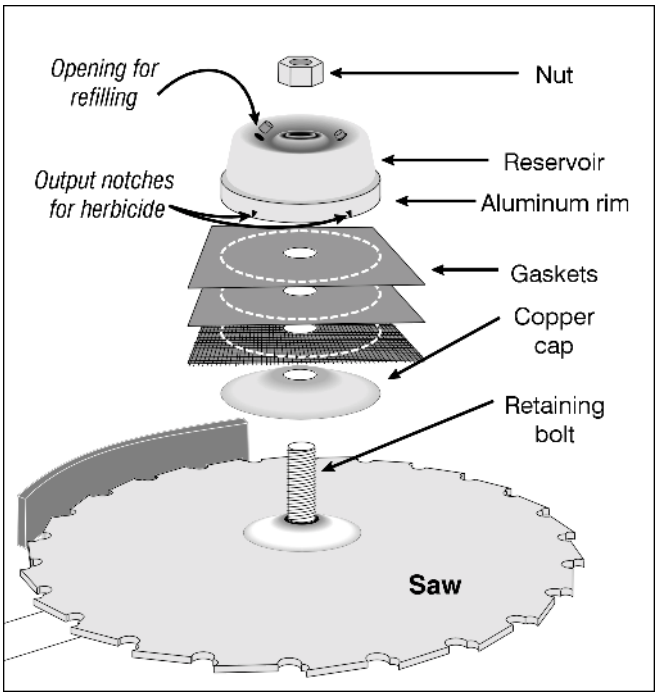

Figure 1. Schematic drawing of the Sprout-Less Herbicide Applicator.

DESCRIPTION OF THE SITE AND THE OPERATION

The study site was approximately 20 km north of Edmundston. After harvesting in 1989, it was planted with black spruce in 1991. The stand density was 20 200 stems/ha, with an average height of 2.2 m and a softwood stocking of 45% (1125 stems/ha); 86% of the crop trees were overtopped by hardwood competition (based on survey data from Fraser Papers Inc.). The target application rate with the Sprout-Less Herbicide Applicator was 55 mL of herbicide solution per refill (75% Vision®). Operators were instructed to change the gaskets whenever less than 30 mL had been

applied between two refuelings of the saw. Two operators, who used Stihl FS 420 and FS 550 brush saws, were timed simultaneously over a period of 3 days. They worked in sections approximately 400 m apart, with slightly different vegetation covers.

RESULTS AND DISCUSSION

The treatment reduced stand densities from 23 600 and 18 250 stems/ha to 2620 and 2210 stems/ha, respectively. Operators reported that they had to slightly modify their normal working technique, but this was not evident during the study. The operators worked for a total of 17.3 and 22.3 Productive Machine Hours (PMH) to treat 1.16 and 1.27 ha, respectively, with resulting productivities of 0.07 and 0.06 ha/PMH (Table 1). The work cycle included the time between refuelings as well as the refueling itself, and ranged between 50 and 110 minutes. Refilling the applicator's reservoir took between 2.4 and 11.1 minutes, and averaged less than 5 minutes. Operators changed the gaskets about every 12 refills (roughly every second day) and took between 8 and 13.4 minutes to make this change. Servicing the applicator (refilling it with herbicide and changing the gaskets) accounted for 6.5 and 7.5% of total PMH, respectively, for the two operators.

Herbicide refills required between 30 and 100 mL and averaged 61 and 80 mL, respectively, for the two operators. The estimated flow rates were 0.82 and 1.34 mL/minute, respectively, for corresponding application rates of 0.63 and 1.14 L/ha for the two operators. The difference between the two application rates can be explained by the stand conditions, operator work habits, and the setup of the device itself; however, it was not possible to determine which factor most affected the application rate during the study.

The estimated direct cost for the Sprout-Less Herbicide Applicator itself is $17.45/ha assuming a working life of 1000 hours and gasket replacement every 12 gas refills. Under a less-favorable scenario (a working life of 360 hours and gasket replacement every 8 refills), this cost would increase to around $58/ha. This cost is still relatively low compared with that of aerial or ground-based foliar herbicide applications. However, the permits and certificates required by herbicide users in certain provinces could discourage the use of the applicator.

Table 1. Results of the time study and productivity summary

	Operator 1	Operator 2
Time elements (% of total PMH)		
Walking to the block	3.3	—
Thinning or brushcutting	84.6	80.7
Servicing brush saw	2.5	6.9
Servicing the applicator		
- Refilling herbicide	5.6	5.5
- Changing gaskets	0.9	2.0
Delays (≤15 min.)	3.1	4.9
Total	100.0	100.0
Average time per cycle (min)	82.0	76.4
Productivity		
ha/PMH	0.067	0.057
PMH/ha	14.9	17.6
Cycles per ha	10.4	13.8
Application rate (mL/ha)	631.8	1138.5

CONCLUSIONS

The Sprout-Less Herbicide Applicator appears to be a promising tool; it is simple, sturdy, and easy to use. FERIC's study showed that only 6.5 to 7.5% of the total PMH was attributed to maintenance of the device. Workers were required to adjust their work habits, but no effect on productivity was evident in this study. Development work to improve the design is still necessary, especially in terms of gasket selection and assembly, because proper calibration of the device poses problems and the device must be adjusted for different operators and sites. The overall treatment cost with the Sprout-Less Herbicide Applicator was low compared with a separate herbicide treatment or a second treatment with brush saws. However, the efficacy of its use must ultimately be judged on the treatment's ability to control resprouting; FERIC did not assess this factor.

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