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POWER MULCHERS CAN APPLY HARDWOOD BARK MULCH

Abstract.—Two makes of power mulchers were evaluated for their ability to apply raw or processed hardwood bark mulch for use in revegetating disturbed soils. Tests were made to determine the uniformity of bark coverage and distance to which coverage was obtained. Moisture content and particle-size distribution of the barks used were also tested to determine whether or not these factors limited machine performance.

Power mulchers (straw blowers) can be used to apply hardwood bark mulch. By creating a high-speed air stream, these machines are capable of blowing straw, hay, and other long-fibered mulches over relatively large areas. Because of this capability, power mulchers are commonly used by seeding contractors and landscapers in the revegetation of highway roadsides, strip mines, watershed dams, and other large areas of disturbed soils.

In our efforts to find uses for the hardwood bark residues from sawmills, pulpmills, and veneer plants, it occurred to us that bark might be used as a revegetative mulch to substitute for straw. With more and more mills installing debarkers, hardwood bark is available in substantial quantities whereas, straw, corncobs, and other mulch materials are scarce and expensive in the Appalachian Region.

In addition, preliminary experiments have shown that hardwood bark mulch performs at least as well as straw mulch. Hardwood bark not only aids seed germination; but, because of its fibrous nature and ability

to resist wind and water action, it minimizes soil erosion during the period between seeding and grass establishment.

Even though hardwood bark is a good revegetative mulch material, we realized that it would be necessary to show that it could be applied over large areas efficiently, quickly, and at low cost. Only then could we show that hardwood bark has commercial possibilities as a revegetative mulch.

Because we knew about power mulchers and that many seeding contractors already owned them, we decided to determine if they could be used to apply hardwood bark mulch. We also sought answers to the following related questions:

- Could power mulchers handle bulk bark directly from the mills, or would bark have to be reduced by hammermilling or other processing?
- Would power-mulcher performance be affected by the moisture content of bark?
- Could power mulchers apply bark evenly over the ground, and to what distance?

Recognizing that these questions would have to be answered before power mulchers could be recommended for use in applying bark mulch, we set about testing two models of currently manufactured power mulchers in the fall of 1969.

Methods

At present power mulchers are manufactured by two companies. Both companies manufacture models of different sizes, but both makes and all models incorporate the same blower designs. In this study we tested a large machine from one manufacturer and a small machine from the other (figs. 1 and 2).

In our testing we used both processed and raw bark mulch of mixed hardwood species. Raw bark from two sawmills was delivered to the test sites in bulk form. The processed bark (raw bark that had been hammermilled, screened, and aged) was obtained from a bark mulch manufacturer and delivered to the test sites in plastic bags, each containing about 50 pounds of material.

The actual tests were conducted by feeding 1,000 pounds of raw bark and 15 bags of processed bark through each machine.

Currently manufactured power mulchers have feed-tray systems designed for baled straw and hay. Our test bark, in bulk and bags, had to be

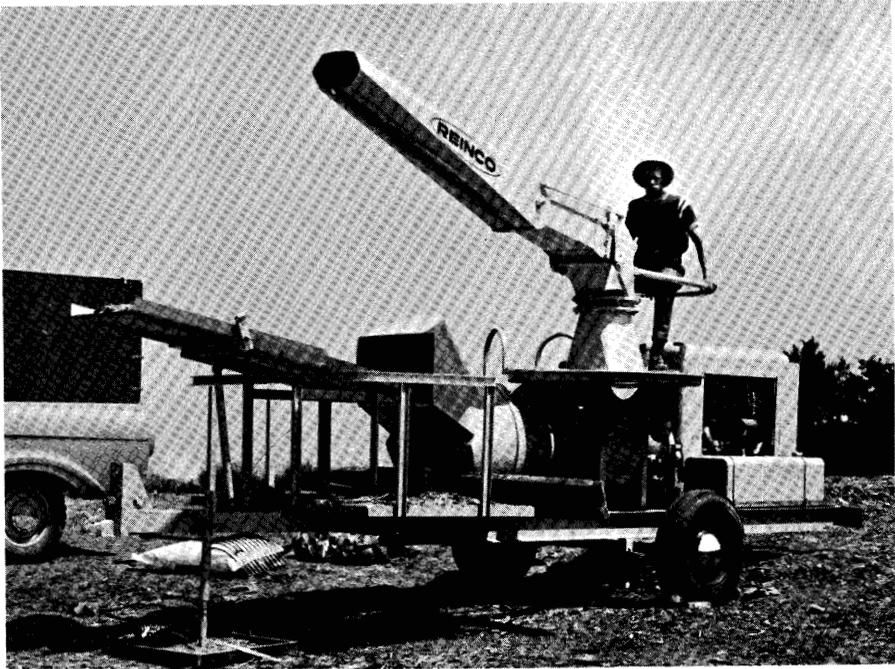


Figure 1.—Large power mulcher.

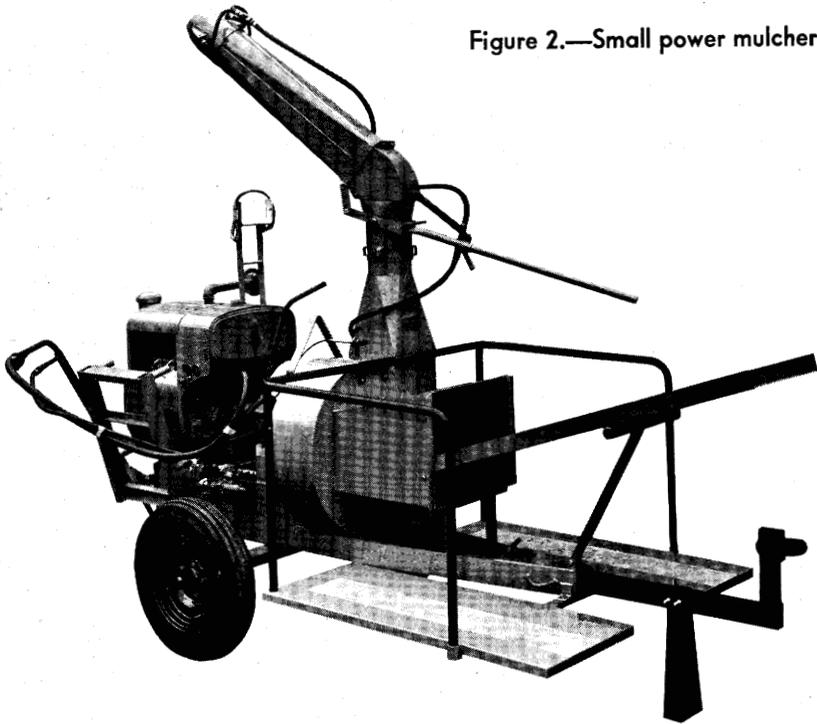


Figure 2.—Small power mulcher.

handled differently. We shoveled the raw bulk bark from a truck onto the feed tray and then manually pushed it into the blower housing. Opened bags of processed bark were dumped onto the feed tray, and the bark was manually pushed into the blower housing.

Even though this was a test of the machines' ability and capacity to blow hardwood bark mulch, we were also interested in how well the mulchers applied bark over the ground. The uniformity of bark coverage and the radius of coverage were determined and recorded for each test application.

Three bark samples were taken from each lot for laboratory determination of moisture content and particle-size distribution.

Study Results

Both power mulchers applied bark easily and uniformly to a maximum distance of 60 feet. Both machines easily handled bark that ranged from 35 to 140 percent in moisture content (table 1). Also, raw bark containing an average of 15.6 percent of pieces 3 inches and larger was applied as easily as processed bark that contained no piece larger than 3 inches (table 1).

Table 1.—Moisture content¹ and particle size distribution of hardwood bark mulch, in percent

Type of bark	Sample No.	Moisture content	Material held on ASTM screens				
			3" x 3"	2" x 2"	1" x 1"	1/2" x 1/2"	Under 1/2" x 1/2"
Processed	1	107	—	—	14.4	15.2	70.4
	2	80	—	—	25.0	20.3	54.7
	3	52	—	1.6	15.4	26.8	56.1
	4	100	—	—	4.6	12.6	82.8
	5	100	—	—	8.3	22.2	69.4
	6	140	—	—	13.5	21.6	64.9
Average ²		85	—	0.3	13.1	20.0	66.6
Raw	1	77	9.8	2.2	26.1	28.3	33.7
	2	69	11.1	1.9	31.5	29.6	25.9
	3	35	34.1	9.1	19.3	15.9	21.6
	4	60	18.2	3.0	3.0	18.2	57.6
	5	105	—	—	6.9	20.7	72.4
	6	74	4.7	4.7	2.3	37.2	51.2
Average ²		66	15.6	4.1	18.3	24.8	37.2

¹ Ovendry basis.

² A weighted average determined on the basis of sample weights.

The feed systems of both machines were designed to handle baled material, not bulk or bagged material such as bark; therefore extra labor was required in feeding bark mulch to the machines.

The operator found it easier to obtain a more uniform coverage with the raw bark because of a bark-soil color contrast. Raw bark, which contained a large amount of wood fiber, had a lighter, more distinctive color against the soil than the dark brown color of the processed bark (figs. 3 and 4).

Figure 3.—Ground coverage and appearance of raw hardwood bark applied with the large power mulcher.



Figure 4.—Ground coverage and appearance of processed hardwood bark applied with the small power mulcher.



Conclusion

Hardwood bark, either raw or processed, can be applied using power mulchers. Tests showed neither the moisture content nor the particle size of the bark to be a limiting factor. However, because of the extra labor required to manually feed bark into the straw blowers, the total process is not efficient for large-scale commercial use.

Research is needed to overcome the problem of feeding bark into currently manufactured power mulchers. Two lines of research are suggested: (1) baling of bark and (2) development of a mechanized feed system for bulk bark. If either of these can be accomplished, then bark can be used commercially as a revegetative mulch on large areas of disturbed soils.

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