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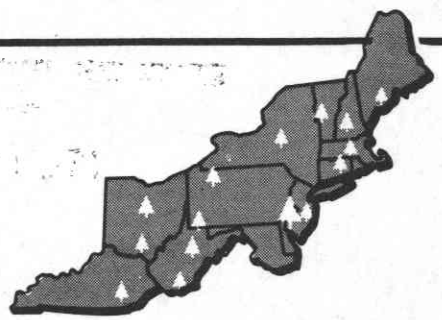

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PROCESSING HARDWOOD BARK RESIDUES BY SCREENING

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Abstract. Most of the hardwood bark residues removed by floating-cutterhead or rosserhead debarkers can be processed into acceptable bark products by screening alone. And by prescreening bark residues, operators of bark processing plants can use smaller hammermills than otherwise are required, thus lowering investment and energy costs.

The most promising commercial uses of hardwood bark products are as mulches for revegetating severely disturbed soils, as a component of growing media in greenhouses, as raw material for producing charcoal, and as fuel for generating steam. For most of these products, bark residues from sawmills require additional processing to obtain the desired particle sizes.

Bark processing facilities usually include a hammermill for reducing the sizes of large pieces of bark, a screen or screens for sorting the milled bark into desirable size classes, and conveyors and transport and storage equipment. Hammermilling requires substantial capital investment, and accounts for much of the investment and operating costs for bark processing. Screening requires less investment and much less energy than hammermilling.

To determine the kinds and amounts of hammermilling necessary for producing products from bark residues, we compared the distribution of particle sizes of bark residues from six sawmills with that of particle sizes of commercial bark products from four plants.

PROCEDURES

We collected samples of bark residue from debarkers at six sawmills in West Virginia and Virginia. Floating-cutterhead debarkers were used at two of the sawmills; rosserhead debarkers were used at the other mills. We also obtained samples of shredded bark mulch and soil conditioner from four commercial bark plants in the same states.

All bark samples were air-dried on plastic sheets for 1 week. Then the samples were weighed and screened with a Gilson shaker. We used screens with openings of 2 inches, and ½, 3/16, 3/32, 3/64, and 1/64 inch. Material that passed through the smallest screen was collected in a pan. After each sample was sieved for 5 minutes, the bark particles retained on each screen and in the pan were weighed and calculated as a percentage of the total weight of the sample.

Table 1.—Distribution of particle sizes of commercial hardwood bark products, by percent of dry weight retained on screen or collected in pan

Product	Bark Plant	Sieve opening (inches)						
		2	1/2	3/16	3/32	3/64	1/64	<1/64
Shredded bark mulch	1	0.0	22.0	24.5	19.1	14.8	12.9	6.7
	2	.1	14.6	41.8	21.0	11.4	6.7	4.4
	3	.0	5.3	34.8	17.7	17.0	17.2	8.0
	4	.0	18.2	46.7	15.3	10.2	6.2	3.4
Soil conditioner	1	.0	.0	.4	14.8	27.6	41.3	16.0
	4	.0	.2	2.6	16.1	28.2	37.7	15.2

Table 2.—Distribution of particle sizes of hardwood bark residues from floating-cutterhead debarker, by percent of dry weight retained on screen or collected in pan

Sawmill	Species	Sieve opening (inches)						
		2	1/2	3/16	3/32	3/64	1/64	<1/64
1	Red oak	5.0	13.4	27.6	16.8	14.1	15.8	7.3
2	Red oak	.5	22.7	40.9	16.9	9.9	5.7	3.4
2	Yellow-poplar	.2	22.3	46.2	14.3	6.8	5.1	5.2
2	Chestnut oak	2.2	41.9	28.5	12.5	6.7	4.0	4.2
2	Hickory	21.2	31.5	27.6	10.1	4.6	2.3	2.7
2	Maple	.0	36.9	39.6	11.1	4.6	4.3	3.5
2	Beech	.0	10.5	33.0	20.1	13.7	15.1	7.6
2	White oak	11.0	29.4	29.0	14.1	7.5	4.6	4.3
2	Basswood	8.7	30.1	35.6	13.1	5.9	4.0	2.6
	Mean (sawmill 2)	5.0	27.5	35.2	14.3	7.8	6.0	4.3

Table 3.—Distribution of particle sizes of hardwood bark residues from rosserhead debarker, by percent of dry weight retained on screen or collected in pan

Sawmill	Species	Sieve opening (inches)						
		2	1/2	3/16	3/32	3/64	1/64	<1/64
1	Mixed	0.9	14.2	43.7	15.3	9.5	10.2	6.2
2	Red oak	2.1	27.6	32.7	12.9	9.0	10.3	5.4
3	Red oak	4.2	33.7	33.6	10.9	6.8	6.5	4.2
4	Red oak	5.5	26.7	35.4	12.5	7.5	8.0	4.3
4	Yellow-poplar	13.1	34.2	33.4	7.1	4.4	4.3	3.5
4	Chestnut oak	.0	24.3	34.6	13.8	10.7	11.0	5.6
4	Hickory	13.9	32.1	35.7	8.1	4.1	3.1	3.0
4	Maple	.0	23.3	40.3	15.6	8.1	7.3	5.4
4	Beech	2.0	15.9	47.1	13.9	7.9	8.1	5.0
	Mean (sawmill 4)	6.2	25.8	38.7	11.6	6.8	6.5	4.4

RESULTS AND DISCUSSION

The distribution of particle sizes for the two commercial bark products is shown in Table 1. Virtually all of the shredded bark mulch passed through a 2-inch sieve opening. And the shredded bark mulch from all four plants contained substantial amounts of particles that would pass through a 3/16-inch opening (from 35.1 to 59.9 percent). Nearly all of the soil conditioner from both sources passed through a 3/16-inch opening.

The distribution of particle sizes for residue samples from sawmills is shown in Table 2 for floating-cutterhead debarkers, and in Table 3 for rosserhead debarkers. Except for maple and beech (Table 2), and maple and chestnut oak (Table 3), the bark residue from both types of debarkers contained more large particles (those retained on the 2-inch screen) than the commercial shredded bark mulch. The amount of the larger particles ranged from zero to 21.2 percent, by weight, of the residue samples.

During the spring, sawmill bark residue probably contains a higher percentage of the larger particles than was indicated by our sample data. But we believe that the larger particles will not exceed 25 percent of the total on a year-round basis.

Particles larger than 2 inches are objectionable in bark mulch because it is difficult to spread this mulch with a machine. However, our research has shown that unprocessed sawmill bark residue is suitable as mulch for revegetating disturbed soil (Sarles and Emanuel 1977). By using a single 2-inch screen, sawmill operators could produce bark mulch—from either type of debarker—without hammermilling. On the basis of the mills we sampled, the yield of acceptable mulch would range from 75 to 100 percent, depending on species and time of year.

By using both 2- and 3/16-inch screens, sawmill operators could produce bark mulch and soil conditioner. These products would meet the standards of the National Bark Producers Association for base bark and soil conditioner products.[1]

In mills where a hammermill is used along with screening, it may be advantageous to screen first, then hog or shred only the larger material. This procedure would help provide an even flow of bark to the hog, permit the use of a smaller hog, and result in lower energy costs.

LITERATURE CITED

Sarles, Raymond L., and David M. Emanuel.
1977. **Hardwood bark mulch for revegetation and erosion control on drastically disturbed sites.** J. Soil Water Conserv. 32(5):209–214.

[1] Category 1, Decorative Bark: product must be 1/4 inch or larger in size, with cambium and wood extraction applied. Category 2, Soil Conditioner: 90 percent of composition of product must be 1/4 inch or less in size. Category 3, Base Bark: any bark product that does not meet requirements of Category 1 or 2; wood-fiber content must not exceed 10 percent (specifically includes pine cambium and shredded hardwood bark).

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