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## USE OF A HAMMER MILL TO HULL AND SCARIFY LESPEDAZA SERICEA SEED

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It is necessary to hull and scarify lespedeza sericea seed to get satisfactory germination. Because regular scarifying machines are relatively uncommon in rural communities and because farmers must bear the expense of shipping their seed for such treatment, the Alabama Agricultural Experiment Station in 1941 began to explore the possibility of using hammer mills for hulling and scarifying lespedeza sericea seed.

At standard speeds, it was found that the hammer mill crushed too many seed. However, by reducing the surface speed of the hammers to 7,000 to 10,000 feet per minute, a hammer mill would hull without breaking over 5 per cent of the seed and germination would be increased. Only 11 per cent of the unscarified seed germinated, whereas 84 per cent of the seed scarified with the regular scarifying machine germinated, and 50 to 68 per cent of the seed put through a speed-adjusted hammer mill germinated. The seed run through the hammer mill do not have as high a germination as those treated in a scarifying machine. While the regular scarifier is more efficient from the standpoint of yielding a higher percentage of germinating seed, the gain may be offset by shipping and commercial scarifying costs. Therefore, farmers who do not have access to scarifying machines would be justified in using their hammer mills or mills in their neighborhoods.

The tests showed that the hammer mill has two advantages over the scarifying machine; namely, (1) It will hull and scarify trashy seed in one operation, whereas the seed must be cleaned before it is put through a scarifier; and (2) it will hull the seed much faster.

For hulling and scarifying lespedeza sericea seed with a hammer mill, the surface speed of the hammers must be reduced to 7,000 to 10,000 feet per minute, and a half-inch screen will be needed.

### Selection of Proper Pulley Size

The surface speed of the hammers will range between 9,000 and 10,000 feet per minute, if the recommended pulley speed given in the accompanying table for each make of mill is used for the hammer mill pulley. According to the test results, this speed range may be lowered even to 7,000 feet per minute, if proper pulleys are available.

If tractor power is used, it will be necessary to change the pulley size on the mill, because the tractor pulley cannot be changed. In the case

where the mill is to be driven by an electric motor, it may be simpler to replace the pulley on the motor with one of proper size.

The following information is needed to calculate the pulley size in order to obtain the recommended operating speed:

- (1) Pulley speed of power unit: For tractors, this information is given in the instruction book, or it may be obtained from your implement dealer; for electric motors, the speed is stamped on the name plate of the motor.
- (2) Diameter of pulley on power unit (tractor pulley or motor pulley).
- (3) Recommended speed of pulley on hammer mill (given in accompanying table for each make of mill).

Two examples are given to illustrate how the proper pulley size for the recommended surface speed may be found.

Example 1. A tractor is used and the pulley on the hammer mill is to be changed to obtain the recommended speed given in the accompanying table.

- (1) Speed of tractor pulley is 600 revolutions per minute (from tractor book or dealer).
- (2) Tractor pulley diameter is 14 inches.
- (3) Recommended speed of hammer mill pulley is 1,900 to 2,100, or a 2,000 r. p. m. average (from accompanying table).
- (4) The diameter of the hammer mill pulley is determined as follows:

$$\frac{\text{Tractor pulley speed (times) tractor pulley diameter}}{\text{Recommended hammer mill pulley speed}} \text{ (divided by) } = \text{Diameter hammer mill pulley}$$

$$\frac{600 \times 14}{2,000} = 4.2 \text{ inches (Use 4-inch pulley on hammer mill.*)}$$

Example 2. The mill is driven by an electric motor. In this case it may be easier to change the pulley on the motor.

- (1) Speed of motor is 1,750 r. p. m. (from name plate).
- (2) Recommended speed of hammer mill pulley is 1,900 to 2,100, or a 2,000 r. p. m. average (from accompanying table).
- (3) Diameter of pulley on hammer mill is 5 inches.
- (4) The diameter of the hammer mill pulley is determined as follows:

$$\frac{\text{Diameter, hammer mill pulley (times) recommended speed}}{\text{Motor speed}} \text{ (divided by) } = \text{Diameter motor pulley}$$

$$\frac{5 \times 2,000}{1,750} = 5.7 \text{ inches (Use 6-inch motor pulley.*)}$$

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\*Always select nearest smaller or nearest larger size pulley.

OPERATING SPEEDS OF HAMMER MILLS FOR HULLING AND SCARIFYING LESPEDEZA SERICEA SEED

Trade name and model of hammer mill	: Dia. of : cylinder	: Recommended : speed of pulley : on hammer mill	: : : : : :	Trade name and model of hammer mill	: Dia. of : cylinder	: Recommended : speed of pulley : on hammer mill
	<u>Inches</u>	<u>R. P. M.</u>			<u>Inches</u>	<u>R. P. M.</u>
Algoma O-K "6-16"	16	2150-2400		Gehl "7"	24	1425 - 1600
Algoma O-K "9-18"	18	1900-2100		Gehl "10"	24	1425 - 1600
Algoma O-K "10-20"	20	1700-1900		Gehl "10" Comb.	24	1425 - 1600
Algoma O-K "12-24"	24	1425-1600		Gehl "15"	24	1425 - 1600
Algoma O-K "15-24"	24	1425-1600		Gehl "15" Comb.	24	1425 - 1600
Bell "10-40"	23	1500-1650		Gleaco "A 5"	18	1900 - 2100
Bell No. 1 Modern	12	2850-3200		Gleaco "A 5 B"	18	1900 - 2100
Bell No. 2 Modern	12	2850-3200		Gruendler "Zenith"	18	1900 - 2100
Case "G-10"	22	1575-1725		Hocking Valley "F"	22-1/2	1525 - 1700
Case "G-14"	22	1575-1725		Hummer "H8"	23	1500 - 1650
Cockshutt No. 1	12-1/4	2825-3100		Hummer "H12"	23	1500 - 1650
Cockshutt No. 2	12-1/4	2825-3100		Jay Bee Cracker Jack	15	2300 - 2550
Cockshutt No. 3	26	1325-1450		Jay Bee Humdinger "3"	15	2300 - 2550
Dellinger "66"	17-1/2	1975-2175		Link Grain Buster	10-1/2	3275 - 3600
Dellinger "78"	23	1500-1650		Link Jr.	10-1/2	3275 - 3600
Dellinger "78 T"	23	1500-1650		Massey-Harris "21"	26	1325 - 1450
Dellinger "48 A"	26-1/2	1300-1450		Massey-Harris "31"	26	1325 - 1450
Dellinger "45 A"	26-1/2	1300-1450		McC.-Deering No. 10	24	1425 - 1600
Dellinger "20"	26-1/2	1300-1450		McC.-Deering No. 2	26	1325 - 1450
Dellinger "44"	26-1/2	1300-1450		McC.-Deering No. 5	23	1500 - 1650
Dellinger "46"	26-1/2	1300-1450		Meadows Gold Medal "10"	22	1575 - 1725
Dellinger "116"	26-1/2	1300-1450		Meadows Gold Medal "20"	25	1400 - 1525
John Deere "10 A"	16	2150-2400		Meadows Gold Medal "30"	25	1400 - 1525
Easy "36"	22	1575-1725		Meadows Gold Medal "50"	25	1400 - 1525
Easy "136"	22	1575-1725		Minn.-Moline MHC	24	1425 - 1600
Fairbanks - Morse "140"	13-1/2	2525-2800		M-S Fords "2"	21	1650 - 1800
Fairbanks - Morse "375"	24	1425-1600		M-S Fords "3"	21	1650 - 1800
Fairbanks - Morse "430"	26-1/2	1300-1450		M-S Fords "6 A"	26-1/2	1175 - 1300
Fairbanks - Morse "560"	26-1/2	1300-1450		Nelson Jumbo "JM"	23	1500 - 1650
Fairbanks - Morse "700"	26-1/2	1300-1450		Papec "X"	27	1275 - 1400

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Operating Speeds of Hammer Mills for Hulling and Scarifying Lespedeza Sericea Seed

Trade name and model of hammer mill	: Dia. of : cylinder: : :	Recommended speed of pulley: : on hammer mill ::	Trade name and model of hammer mill	: Dia. of : cylinder: : :	Recommended speed of pulley : on hammer mill
	<u>Inches</u>	<u>R. P. M.</u>		<u>Inches</u>	<u>R. P. M.</u>
Papec "10"	27	1275 - 1400	Stover "93"	16	2150 - 2400
Papec "13"	27	1275 - 1400	Viking Jr.	14	2450 - 2700
Papec "13R"	27	1275 - 1400	Viking Master	20	1700 - 1900
Papec "MS"	27	1275 - 1400	Western Bearcat "3 ARR"	21	1650 - 1800
Papec "MSR"	27	1275 - 1400	Western Bearcat "7 A"	21	1650 - 1800
Port Huron No. 3	13-1/2	2525 - 2800	Western Bearcat "2 A"	21	1650 - 1800
Port Huron No. 4	18	1900 - 2100	Western Bearcat "4 A"	21	1650 - 1800
Prater Blue Streak "155"	31	1100 - 1225	Western Bearcat "1 AS"	21	1650 - 1800
Prater Blue Streak "20"	37	925 - 1025	W-W "330"	12	2850 - 3200
Prater Blue Streak "205"	31	1100 - 1225	W-W "110"	12	2850 - 3200
Prater Blue Streak "30"	37	925 - 1025	W-W Triplet	18	1900 - 2100
Standard Steel "4"	45	750 - 850	W-W "18 - 18"	18	1900 - 2100
Standard Steel "GP"	40	850 - 950	W-W "18 - 24"	24	1425 - 1600
Stover "87"	12	2850 - 3200	W-W "F 22 - M"	12	2850 - 3200
Stover "88"	16	2150 - 2400	W-W "F 24-M"	18	1900 - 2100
Stover "91 A"	16	2150 - 2400	W-W "F 26-M"	18	1900 - 2100
Stover "66"	14	2450 - 2700	W-W "F 27-M"	18	1900 - 2100
Stover "67"	14	2450 - 2700	W-W "F 28-M"	18	1900 - 2100
Stover "92"	16	2150 - 2400	Wetmore Clipper	5	1000 - 1100

Note : This list is based on specifications of farm hammer mills from "The Tractor Field Book" 1939-1940 published by Farm Implement News Co., Chicago, Illinois.