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# Lespedeza Sericea

University of Tennessee Agricultural Experiment Station

C.A. Mooers

H.F. Ogden

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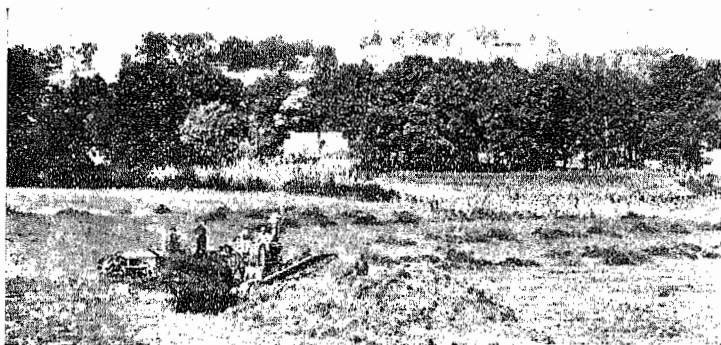
BULLETIN No. 154

FEBRUARY, 1935

LESPEDEZA SERICEA

By

C. A. MOOERS AND H. F. OGDEN



Threshing a seed crop.

KNOXVILLE, TENNESSEE

## SUMMARY

1. *Lespedeza sericea*, a native of Asia, has been grown by the Tennessee Experiment Station since 1927.

2. It is a long-lived perennial legume, with somewhat woody stems, well supplied with leaves, and a heavy seed producer. Growth begins in the spring, about the time killing frosts are over, and continues until killing frost in the fall.

3. The two principal strains, Nos. 04730 and 12087, are similar, and both are well adapted to the soils and climate of Tennessee.

4. The lime, phosphate, and potash requirements are not high, but on most soils these mineral elements can be used to much advantage.

5. Fifteen pounds per acre of scarified seed may be successfully sown from February to late July, but best results have been obtained by sowing in March, before weeds start, or in early summer, after weeds have germinated and been killed by harrowing.

6. Twenty-five pounds per acre of unhulled seed can be recommended, but the seeding should be made in January or February.

7. The seedbed should be firm, and seeds barely covered, or not covered at all if sown in freezing weather.

8. Good results have attended seeding with various nurse crops, but seedings on established meadows or pastures have failed.

9. Growth the first year may be disappointing, since often little is realized except weeds and grass that should be mowed and raked off late in the fall and possibly in late July. Growth is much more vigorous the second and third years, yielding two or three cuttings 20 inches high.

10. The yield of hay is much superior to that of any of the annual lespedezas, but may be inferior to that of alfalfa under conditions favorable to alfalfa.

11. The hay is similar to annual lespedeza in chemical composition and feeding value, though somewhat less palatable to some animals. Alfalfa hay appears superior to sericea hay in quality, but further experiments are required to determine the true value of the latter.

12. Sericea furnishes more abundant pasturage during the summer than any other leguminous crop, but is somewhat lacking in palatability.

13. It is characterized by high yields of seed, which shatter badly if allowed to become dead ripe or if the plants are handled when too dry.

14. Dodder may be a serious pest, but can usually be controlled by close mowing, pasturing, or hand-roguing.

15. The experience of farmers with sericea, though limited, is favorable and indicates that the crop is worthy of extensive trial throughout Tennessee, especially on the more hilly land deficient in lime and phosphate. Under these conditions it seems likely to surpass all other legumes in reducing erosion and providing hay and pasturage.

# LESPEDEZA SERICEA

By

C. A. MOOERS AND H. P. OGDEN

## INTRODUCTION

The perennial leguminous plant known as *Lespedeza sericea* is a native of Eastern Asia, where it is found growing wild but not under cultivation. It has been grown at the Tennessee Station since 1927, when a small quantity of seed was received from the Division of Forage Crops and Diseases of the U. S. Department of Agriculture. For the first few years the plants were under observation only as to the nature of growth, hardiness, and the like; that is, no special experiments relating to culture and feeding value were undertaken. The plants made a healthy, attractive growth from the outset, and the crowns proved winter-hardy in spite of zero weather. Since 1930, more thorough trials of this crop have been made both at the Knoxville Station and at the various substations in all three divisions of the State. The object of this bulletin is to present the information obtained.

## CHARACTERISTICS

Growth starts in the spring before danger of frost is over and continues until "killing" frost in the fall. The mature plants frequently grow 4 to 5 feet in height, with main stems too coarse and woody to be eaten by livestock. The leaves are narrow and small, varying from  $\frac{1}{4}$  to 1 inch in length, but the percentage of leaves to stems is high at all stages of growth. Cuttings at a hay stage of about 20 inches height were found to vary from 55 to 67 per cent leaf, the former being obtained in early May and the latter in early October. Air-dry mature plants from a seeding made May 2, 1932, and harvested October 28, analyzed 42 per cent stems, 42 per cent leaves, and 16 per cent seed.

The first year's growth consists of a single main stalk, which, when crowded by weeds or grass, may reach a height of only a foot, or even less, and produce few or no branches; but under more favorable conditions the height may be 2 or 3 feet, with much branching. The latter habit is characteristic of crops planted in rows and given clean cultivation, while the former is common in broadcast seedings, which often appear unpromising the first year. The second year, from one to several shoots grow from each crown, so that the stand appears to have thickened materially. Furthermore, the growth is far

160056

more vigorous than that of the previous year and there is a marked reduction in the competition of weeds and grass. In the third year of a broadcast seeding there is a further increase in the number of shoots per crown, in the vigor of growth, and in the thickness of stand. In the case of very poor land, two or three years may therefore be required to show what it will do.

The crop is characterized by drouth resistance; ability to cope with weeds and grass, especially after the first year; adaptability to ordinary uplands; and high yield of seed, as well as of hay and pasturage.

Lack of inoculation on Tennessee soils has not been observed. Sparse inoculation is occasionally noticed the year sown, followed by apparently full inoculation the second year.

Extravagant statements have been made regarding its ability to crowd out either Johnson grass or Bermuda grass. Results on the Station farm indicate its ability to grow in patches of Johnson grass. After some years the Johnson grass becomes less vigorous and the sericea more vigorous.

The Station has never been able to get a stand of sericea where Bermuda grass was thick. However, where the Bermuda was very thin, sericea grew well, and when not cut was able to smother the Bermuda. On the other hand, when cut repeatedly for hay the sericea gradually gave way to the Bermuda.

### SEED CHARACTER AND PRODUCTION

At the Knoxville Station sericea is in bloom from a little after the middle of August to nearly the middle of September. The flowers are frequented by honey bees, which have been proved to be getting nectar. The seed are ripe and ready to harvest the latter half of October or early in November. At the West Tennessee Station the plants are in bloom somewhat earlier than at Knoxville and the seed crop is harvested earlier.

The rainfall during the fruiting period greatly influences the seed yield, which in the Station trials has varied from 150 to 1500 pounds of hulled seed per acre. The hulled seed, both in size and weight per bushel, are nearly the same as red clover. At the Knoxville Station the number of hulled seed per pound has varied from 300,000 to 350,000, depending on the seasonal conditions; the larger number being obtained when the latter part of the ripening period is very dry, as in 1931, and the smaller number when the season is wet, as in 1932. In these two years the number of unhulled seed per pound varied from 280,000 to 300,000.

### SEED GERMINATION

The germination of the unhulled seed is very slow, due to the large percentage of "hard" seed. For example, 16 per cent germinated in 10 days in a germination trial, but only 2 per cent put out cotyledonous leaves in the same length of time when the seed were planted in sand in the greenhouse. On the other hand, 50 to 75 per cent sprouted in the same length of time in germinator trials of scarified seed. Even well-scarified sericea seed are slower to come up than the seed of common clovers and alfalfa.

### VARIETIES OR STRAINS

Two principal strains have been distributed by the Division of Forage Crops, and are known by the numbers 04730 and 12087. Some seed was sent out under the number 17291, but its origin is the same as that of 12087; hence, only minor differences can be expected between them. In competition with weeds, 04730 is somewhat more aggressive than 12087, and it always makes a quicker growth in the spring, so that the first cutting of hay is ready a week or ten days before that of 12087. It also matures seed a week or two earlier and can be expected to grow advantageously farther north and at higher elevations than 12087. There seems to be little difference between the strains in total hay production in a season, as indicated in tables 1 and 2. The seed yield, however, has been in favor of 04730.

In 1932 Mr. Ernest Keisling, a farmer in Overton County, found *L. sericea* growing wild along Eagle Creek. This discovery was verified by members of the Station staff who visited the section and traced plants from the flour mill down the creek. Plants had been noticed by near-by residents for several years, but only for a short distance along the creek. Dr. A. J. Pieters, of the U. S. Department of Agriculture, reported that a small lot of seed had been sent by the Department to a farmer of an adjoining county who later moved to the vicinity of Eagle Creek. This is the probable origin of the only wild *L. sericea* that has come to the attention of the Station. Seed were taken to Knoxville and planted in the spring of 1933. The habit of growth of the plants obtained proved to be very similar to that of 04730.

### SOIL ADAPTABILITY

Sericea has been found to make an excellent growth on various kinds of soil, but it appears better suited to the heavier loams than to lighter types of soil. It has done especially well at the West Tennessee Station on Memphis silt loam and at the Knoxville Station on a heavy Cumberland loam. Apparently it can be grown to advantage on soils too poor for a profitable corn crop.

The lime requirement of sericea appears to be similar to that of annual lespedezas; that is, liming is not essential to the getting and maintaining of a good stand, but frequently gives a material increase in yield both of hay and seed. Large crops cannot be expected, of course, on very poor land, but the probability is that it will do better there than anything else if allowed to grow undisturbed for a couple of years.

Although the general adaptability of Tennessee soils to sericea has been amply demonstrated, a surprising exception was found in the case of a fertile brown loam at the Middle Tennessee Experiment Station. This soil was largely derived from the decomposition of phosphate rock, a not uncommon occurrence in Maury County. On this soil, sericea has been tried for several years, but has signally failed to make more than a poor and unattractive growth. Since the soil is rich in phosphate, and well supplied with other soil elements required by plants, the reason for this failure is not apparent, especially as other crops, such as clover and bluegrass, thrive on it.

## VALUE FOR PASTURE AND HAY

### PASTURE

Grazing trials with both cattle and sheep were made on second-year sericea at Knoxville in the summer of 1934. With both kinds of livestock, lack of palatability of the crop was evident. Five cattle were turned onto a field of nearly pure sericea in June and kept there until October without supplemental feed. The animals were in good condition at the outset, having come from an excellent bluegrass pasture, and weighed, on the average, 942 pounds. At the end of 4 months the average weight was 936 pounds. While in this trial sericea pasture served only as a maintenance ration, it should be borne in mind that this is probably as much as bluegrass would have done at the same time of year.

The pasture used for the sheep contained enough grass, weeds, and annual lespedeza to support the animals, which ate only sparingly of the sericea. In a previous trial of short duration at the West Tennessee Station sheep on a pure stand of sericea supported themselves readily, eating all the leaves and finer stems.

The Missouri Station<sup>1</sup> reports that cows were grazed alternately on sweet clover and sericea without change in milk flow; also that after the milk flow had been reduced by the placing of the animals on a poor permanent pasture, the flow came up to normal upon their return to the sericea pasture.

<sup>1</sup>Missouri Station Bulletin 331, page 13.

## HAY

Four Holstein cows were used in a feeding trial of hay at Knoxville in the winter of 1933-34. Two of the animals were given a standard grain ration and all the alfalfa hay they would eat. The other two were given all the sericea hay they would eat and the same amount of the grain ration as for the alfalfa group. At the end of the 3 months' trial, both the milk record and the weights of the animals indicated no positive choice between the two kinds of hay.

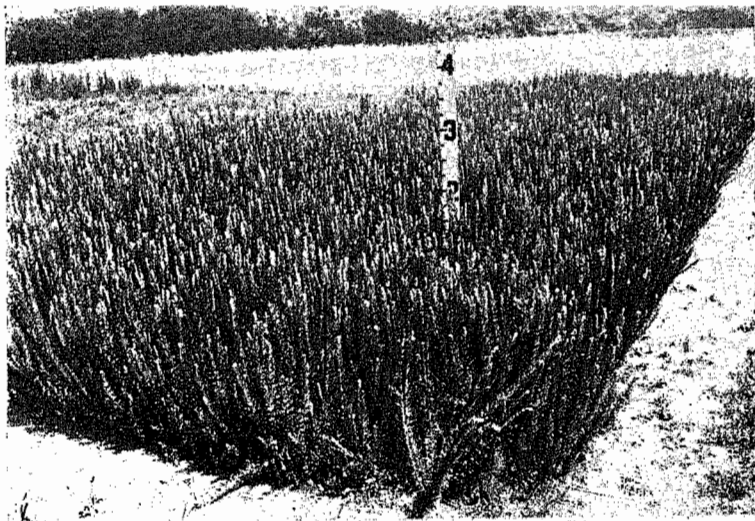


Fig. 1—A first crop ready to be cut for hay.

Two feeding trials were carried out at the West Tennessee Station with Jersey heifers, which were given a grain ration in addition to hay. One group was given alfalfa hay and the other sericea hay. Analysis of the data showed that after a few days required for the sericea group to become accustomed to the hay the gains in weight were similar for the two groups.

A pair of horses were fed for several months in winter on sericea hay alone; that is, without grain. They maintained their weight and appeared in excellent condition in every way, and, unlike the cows and sheep, ate the hay without hesitation from the outset.

The Poultry Department of The University of Tennessee has found that the leaves of sericea hay are readily eaten by poultry and could take the place of alfalfa in the ration.

Numerous questions remain to be answered more fully than can be done at the present time. In particular, more information



is wanted in regard to the results that can be expected when sericea hay is fed alone and also when various other concentrates are fed with it. The indications from the limited feeding trials made are favorable. In this connection it may be mentioned that in the Station's trials up to the present time no unfavorable symptom has appeared in any animal when either pastured on sericea or fed the hay.

Sericea hay probably has about the same feeding value as hay made from annual lespedezas, which it resembles closely in chemical analysis. The first cutting is likely to be rather coarse and "stemmy", especially when grown on a thin stand. If not allowed to lie in the sun too long, it retains its leaves well and cures out to a bright green color. After being stored in the mow, the leaves shatter badly, which makes it a little more troublesome to handle than other hays.

Table 1 gives the so-called approximate analyses of both the whole plant and the leaves and stems separately when cut at a good hay stage with plants about 20 inches in height. As would be expected, the leaves are high in protein and ether extract, or fat, and low in crude fiber, as compared with the stems. It is also noticeable that there is a decrease in the protein of the whole plant as the season advances. For example, the protein content of the hay for the first cutting was 14.51 per cent, and for the second cutting on the same plot, 12.20 per cent. A still later second cutting on an adjoining plot gave only 11.65 per cent protein. This, however, is nearly twice that found in timothy hay, the average protein content of which is 5.9 per cent. In other constituents the two hays analyze much alike.

TABLE 1—Approximate analyses (air-dry basis)

Sample	Harvested 1932	Cutting	Range and plot	Moisture	Protein (N x 6.25)	Ether extract (Fat)	N-free extract	Crude fiber	Ash
				P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Leaves	May 30	.....	.....	11.08	18.52	1.25	45.46	18.59	5.14
Stems	"	.....	.....	10.99	8.17	0.74	34.31	42.02	3.77
Whole plant(hay)	"	First	7—25	11.01	14.51	1.05	41.15	27.68	4.61
Leaves	Aug. 19	.....	.....	9.68	15.05	2.33	49.60	18.28	5.06
Stems	"	.....	.....	9.19	7.86	0.51	36.40	42.61	3.44
Whole plant(hay)	"	Second	7—25	9.49	12.20	1.61	44.38	27.90	4.42
Leaves	Sept. 7	.....	.....	10.43	14.48	2.19	50.19	17.78	4.94
Stems	"	.....	.....	10.11	7.85	0.58	35.46	42.97	3.03
Whole plant(hay)	"	Second	7—26	10.29	11.65	1.51	43.90	28.53	4.12

### EFFECTS ON SOIL FERTILITY

All crops contain plant food, and the larger the crop the heavier the draft on the soil. Sericea hay, from both first and second cuttings in 1931, was analyzed, with results as follows:

	Moisture (H <sub>2</sub> O) Per cent	Lime (CaO) Per cent	Phos. acid (P <sub>2</sub> O <sub>5</sub> ) Per cent	Potash K <sub>2</sub> O Per cent	Nitrogen (N) Per cent
First crop, cut May 15_____	11.54	1.11	0.53	1.24	2.31
Second crop, cut July 30_____	13.22	0.99	0.45	1.21	2.15
Average _____	12.38	1.05	0.49	1.23	2.23

On the average, a ton of hay was found to contain 21 pounds of lime, 9.8 pounds of phosphoric acid, 24.6 pounds of potash, and 44.6 pounds of nitrogen. It is evident, therefore, that large yields will draw heavily on the soil supply of the important mineral elements, phosphoric acid, potash, and lime. A large part of the nitrogen is, however, assumed to come from the air. At the Mericourt Station, Clarksville, sericea was found to be highly responsive to applications of both phosphate and lime.

The effects of sericea on crops which follow appear good—in fact, on a par with the best soil-improving crops, such as alfalfa and red clover. At the Jackson Station, after sericea had been removed either as hay or as a seed crop for 3 years, the land was put in corn and produced 60.5 bushels per acre, a yield equal to any on the farm for that year. Before sericea was grown on this land, a yield of only 25 to 35 bushels was expected. Similar results were obtained at the Knoxville Station.

Mention may be made of the fact that sericea appears to be somewhat more easily plowed up than alfalfa, and that it gave no special trouble in the cultivation of the corn crop.

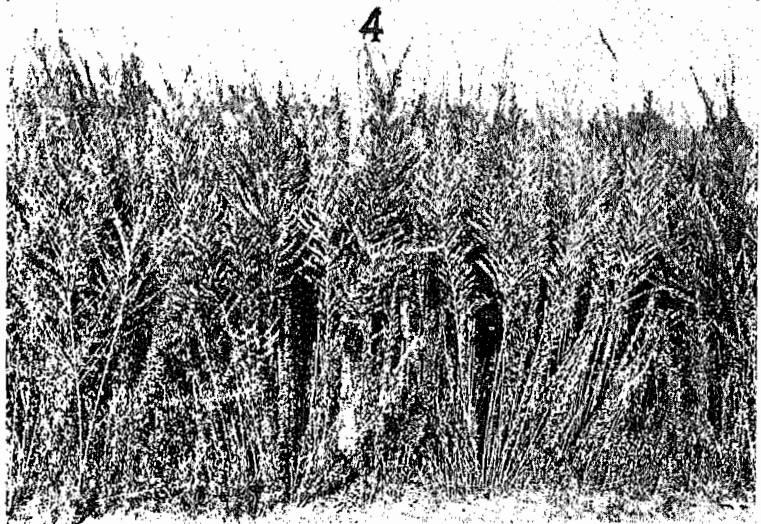


Fig. 2—Mature sericea of a full season's growth.

### VALUE IN EROSION CONTROL

Sericea has proved valuable in erosion control. Both the thick growth, in particular following the production of a seed crop, and the coating of fallen leaves which the soil receives, prevent erosion. Moreover, sericea when allowed to remain uncut was not found to be a fire hazard; that is, ignition is difficult even in the driest of fall weather and was not found possible from a lighted cigaret thrown into the accumulation of fallen leaves. Even when a fire was started by special means it soon died out unless crabgrass or the like was present in sufficient quantity to carry on combustion.

### COMPARATIVE YIELDS OF SERICEA, ANNUAL LESPEDEZA, AND ALFALFA

Some comparisons between hay yields of sericea, annual lespedeza No. 76, and alfalfa are reported in table 2. At the Knoxville Station lined land was used for all crops. The soil was Cumberland loam underlaid with a heavy, compact subsoil, which did not prove well adapted to alfalfa, as is indicated by the low yields for this crop. The yields of sericea hay averaged 3.56 tons per annum for the years 1930, 1932, 1933, and 1934. The alfalfa average for the same years was 2.11 tons, and the average for lespedeza No. 76 was 1.50 tons.

TABLE 2—Yields of sericea in comparison with alfalfa and annual lespedeza No. 76

Location and soil	Crop	Year and acre yields					
		1930 Hay Tons	1931 Seed Pounds	1932 Hay Tons	1933 Hay Tons	1934 Hay Tons	Hay Average Tons
Knoxville Cumberland loam of moderate fertility	04730	3.17	202	3.96	3.56	3.76	3.56
	12087	2.90	137	4.09		3.50	
	Alfalfa	1.98	.....	1.87	2.75	1.82	2.11
	No. 76	1.44	.....	2.18	2.37	0.00	1.50
Clarksville Gravelly loam soil	04730		(1932)				
	12087	.....	919	.....	.....	.....	.....
Jackson Memphis silt loam			Hay Tons				
	Range 8	.....	2.94	4.44	3.77	.....	3.72
	Range 9	.....	5.67	5.78	5.20	.....	5.55
	Range 5	.....	2.72	2.77	2.52	.....	2.67



Alfalfa

L. sericea 12087

L. sericea 04730

Fig. 3—A comparison of foliage production.

The trials at the Jackson Station were made on Memphis silt loam soil of moderate fertility. The yields, however, are not fairly comparable, since the alfalfa on range 9 grew on limed land, whereas both the sericea and lespedeza No. 76 grew on unlimed land. Without liming, the alfalfa would have been a complete failure, as demonstrated repeatedly on this soil. The average yields per acre for the 3 years 1931, 1932, and 1933 were 3.72 tons for sericea, 5.55 tons for the alfalfa, and 2.67 tons for the lespedeza No. 76.

In both the Knoxville and the Jackson Station trials sericea out-yielded lespedeza No. 76 by more than a ton of hay per acre annually. The comparison with alfalfa at the latter place is evidently not fair, since the great advantage of sericea is that it will thrive on unlimed land where alfalfa would fail.

## DATE OF SEEDING

Results obtained in date-of-seeding trials at the Knoxville Station for the years 1932 and 1933 are given in table 3. The wide range of favorable seeding dates for this crop is evident, for good stands were obtained in nearly every trial from February 15 to July 15. Seeding on wheat, at the same time and manner as for red clover, appears very promising. Seeding may be done after wheat harvest. In such a case perhaps the best plan would be to disc the land and keep clean of weeds by occasional harrowing until sometime in July when the moisture content of soil is favorable, then sow the sericea by itself. If the sericea is to follow a corn crop of the previous year, seeding may be done in March, either alone or in connection with spring oats. Excellent results were obtained from

TABLE 3—Acre yields of hay from date-of-seeding experiments at the Knoxville Station

Series 1—Soil: A Gravelly Loam of the Clarksville Series—Good Fertility

Range 2 Plots	Date seeded 1932	Date up 1932	Stand in 1932	Crabgrass infestation in 1932	Height of sericea in 1932	Yields in 1933		
						June 19	Sept. 8	Total hay
					Inches	Tons	Tons	Tons
1 & 8	April 28	May 16	Poor	Very bad	3 to 9	1.73	2.05	3.78
2 & 9	May 17	June 11	Poor	Very bad	3 to 9	1.44	2.01	3.45
3 & 10	June 5	June 14	Fair	Bad	3 to 9	2.30	2.33	4.65
4 & 11	June 24	July 7	Excellent	None	6 to 15	2.49	2.15	4.63
5 & 12	July 13	Aug. 18	Fair	None	2 to 4	1.36	1.85	3.21

Series 2—Soil: Fertile Bottom Land—Huntingdon Loam

Range A Plots	Date seeded 1933	Stand in 1933	Crabgrass 1933 crop	1933 crop		1934 crop
				Per cent	Tons	
				Tons	Tons	
1,10 & 19	April 15	Excellent	60	2.90	4.43	
2,11 & 20	May 1	Excellent	67	2.59	4.21	
3,12 & 21	May 15	Good	57	2.34	3.21	
4,13 & 22	June 1	Fair	48	2.21	3.00	
5,14 & 23	June 15	Poor	10	0.70	3.68	
6,15 & 24	July 1	Excellent	10	0.91	4.66	
7,16 & 25	July 15	Excellent	10	0.51	4.47	
8,17 & 26	Aug 1	Poor	....	....	4.82	

Series 3—Soil: Cumberland Loam of Good Fertility—Seeding on Wheat

Range 14 Plots	Date seeded 1933	Stand in 1933	Height Oct. 2, 1933	Crabgrass and weeds in 1933	1933 crop		1934 crop
					Per cent	Tons	
					Inches	Tons	
1 & 9	Feb. 15	95	15	45	1.26	1.02	
2 & 10	March 1	100	19	45	1.26	4.12	
3 & 11	March 15	80	14	45	0.74	3.67	
4 & 12	April 1	80	12	50	0.89	3.53	
5 & 13	April 15	83	14	55	0.88	3.66	
6 & 14	May 1	78	10	70	0.73	3.32	

early spring plowing, followed by harrowing to kill weeds until well into June. In this way there was little trouble from weeds and grass. This method is, however, better suited to poor than to rich soil, especially if morning-glories and crabgrass are prevalent.

Sericea has been successfully seeded between the rows of corn after the last cultivation both at the Experiment Station and on other farms in Tennessee. While this method of seeding cannot be recommended for general practice, it is worthy of trial where conditions are favorable, such as on land of only moderate fertility, where spacing of the corn was wide and where weeds and crabgrass were not permitted to grow. Best results with this method are obtained when seeding is done not later than July 20.

If unhulled seed are used, they should be sown in the winter, preferably in January or early February.

#### RATE OF SEEDING

Although the seed of sericea are similar in size to those of red clover, the evidence at hand indicates that a higher rate of seeding is advisable for sericea. Table 4 gives the results from a rate-of-seeding trial at the Knoxville Station. The soil was fertile Cumberland loam. The seasonal conditions were favorable, so that the results obtained should be interpreted from that point of view. The yields and the appearance of the stands indicated that 15 pounds of seed per acre gave as good results as any. The 5- and 10-pound rates of seeding resulted in hay yields that were inferior to any from the higher rates of seeding in 1933, but in 1934 only the 5-pound rate

TABLE 4—*Acre yields of hay in a rate-of-seeding and varietal trial at the Knoxville Station*

Soil: A Fertile Cumberland Loam

Plot No.	Rate of seeding per acre	Strain No.	1933			1934			Remarks
			First cutting	Second cutting	Total	First cutting	Second cutting	Total	
			Tons	Tons	Tons	Tons	Tons	Tons	
7	5	04730	1.09	2.47	3.56	2.41	2.33	4.74	Seeding done in spring of 1932.  Cuttings made in:  1933 June 15 Sept. 7  1934 June 16 Sept. 7
8	10	"	1.41	2.12	3.53	3.00	2.51	5.51	
9	15	"	1.57	2.64	4.21	3.07	2.51	5.58	
10	20	"	1.65	2.21	3.86	2.63	2.30	5.43	
11	25	"	2.20	2.13	4.33	2.67	2.30	5.47	
12	30	"	2.00	2.13	4.13	2.96	2.63	5.69	
13	35	"	2.00	2.71	4.71	2.82	2.84	5.66	
14	40	"	2.04	2.45	4.49	2.64	2.37	5.01	
15	45	"	1.88	2.24	4.12	2.71	2.42	5.13	
22	5	17291	1.37	2.33	3.70	2.11	2.10	4.21	
23	10	"	1.61	2.33	3.94	2.40	2.39	4.79	
24	15	"	1.88	2.48	4.36	2.43	2.36	4.79	
25	20	"	2.20	2.40	4.60	2.64	2.50	5.14	
26	25	"	2.32	2.13	4.45	2.64	2.50	5.14	
27	10	12087	1.24	2.23	3.47	2.35	2.10	4.45	
28	15	"	1.76	2.28	4.04	2.81	2.03	4.84	
29	20	"	2.17	2.28	4.45	2.49	2.36	4.85	
30	25	"	2.13	2.10	4.23	2.46	2.42	4.88	

continued to yield low. Of course, a single trial cannot give convincing results, but the data, along with previous experience in miscellaneous seedings, suggests that 15 pounds of scarified seed per acre is not far from the right amount. If unhulled seed are to be used, 25 pounds per acre is advised.

### GETTING A STAND

Failure to get a stand of sericea is not an uncommon complaint, even when unhulled seed is used. Slow germination is partly responsible, but the seed may be covered too deep or the seedlings may be caught just under a soil crust caused by a heavy rain followed by dry, cold winds. Seedlings that have come up in the bottom of cultipacker tracks may be entirely covered with dirt if a heavy rain comes at this critical time. Fine sandy soils on level fields are sometimes bad. The young seedlings are rather delicate and grow very slowly during the first month or so, and may be smothered by crabgrass, especially if the seed is sown during the season that crabgrass is sprouting. Care must be taken to give sericea favorable conditions for its first month's growth. After it is once 3 or 4 inches high it is almost certain to be able to cope with any conditions likely to be encountered.

Early March seeding on a settled seedbed, with just enough surface irregularity for the seed to find lodgment in the top quarter inch of soil, obviates most of the difficulties. Just how to prepare such conditions depends on the type of soil and the kinds of crops previously grown or occupying the ground at the time. Soils that are inclined to be "puffy" in the spring should be rolled, or, if in wheat or barley, may be trampled by pasturing, either before or after seeding. Soils that "run together" hard and smooth should be harrowed before seeding.

Seedings made from late spring to early summer require more care in preparation of the seedbed to induce the germination of weed seed, followed by cultivation to destroy them.

July seedings usually have less competition from weeds, but are likely to suffer from drouth unless the seedbed is in the proper condition. Land that has been in early-cultivated crops is easily prepared for seeding. A seedbed such as would be prepared for August-sown alfalfa is good, but seedings should be made not later than July 20, or even earlier on poor land.

Since sericea will probably be often sown on rough land or land of low fertility to build it up and reduce erosion, it should be seeded as cheaply as possible. In the light of the work of the Station this would seem to be in early March either on winter crops or on land cultivated the previous year and left bare through the winter.

Seedings on grassland or pastures of annual lespedeza are not likely to succeed.



Fig. 4—Second growth from stems cut at different heights.

### THE HAY CROP

Granted a good stand, a sericea hay crop is probably unsurpassed in certainty after the first year. The usual growth is too small the year of seeding to make it worth while of itself to be cut for hay. A cutting of grass, weeds, and sericea can sometimes be made in midsummer of the first year to advantage, but such a cutting may be detrimental to the sericea plants, which recover slowly and are given a distinct setback. However, the advantage of removing a heavy growth of weeds and grass may more than offset the retardation of growth of the sericea. The grower must use his judgment in the matter. A late fall mowing is usually desirable the first year, both for such hay as may be obtained and to remove weeds so that the land will be clean for the next year's crop.



### NUMBER OF CUTTINGS

Table 5 gives the comparative yields of hay when the number of cuttings was varied from 2 to 4. The data are from a broadcast seeding made in 1930, but are for only a single season, 1933. The results, however, are in harmony with previous observations as to the tendency when the number of cuttings is increased. With 2 cuttings, May 15 and September 5, the total yield was 4.14 tons per acre. With 3 cuttings, May 15, June 29, and September 5, the total yield was only 3.39 tons per acre. Where 4 cuttings were made, on May 15, June 29, August 17, and October 5, the yield was 3.28 tons, but the last cutting of .56 ton per acre consisted largely of crabgrass. It is evident, therefore, that in this trial increasing the frequency of cutting reduced the yield. In this connection, the size of the stems is an important item. Horses and mules will usually leave little waste even when the hay crop is 2 feet high at time of cutting. On the other hand, cattle would leave the coarser stems uneaten.

TABLE 5—*Influence of number of cuttings on yield of hay—Jackson Station—season of 1933*

Cutting	Yields per acre						Notes
	2 cuttings		3 cuttings		4 cuttings		
	Date	Yield Tons	Date	Yield Tons	Date	Yield Tons	
First	May 15	0.84	May 15	0.83	May 15	0.75	Seeding done in spring of 1930
Second	Sept. 5	3.30	June 29	0.67	June 29	0.58	
Third	.....	.....	Sept. 5	1.89	Aug. 17	1.39	
Fourth	.....	.....	.....	.....	Oct. 5	0.56	
Total	.....	4.14	.....	3.39	.....	3.28	Fourth cutting largely crabgrass

### BEST HEIGHT FOR HAY

The early cutting is from stems coming from the crown of the plants, and is much coarser than any other; hence, care should be taken not to let the growth get too tall. An average of 20 inches is about right. The second cutting comes from shoots, which branch out from the stubble and not from the crown. Since there are two or three times as many shoots for the second crop, a much finer-stemmed hay results and there may be little or no waste even when fed to dairy cows. On good land there is usually a third crop, which should be cut early in October.

### CURING

Sericea hay cures quickly and can usually be put into the mow the next day after cutting, but care should be taken to prevent loss of leaves by shattering, which may be considerable if the crop is handled when too dry. Under favorable weather conditions baling from the field appears feasible.

### DODDER

Dodder, or love vine, is a serious pest to sericea—so much so that care should be taken to avoid buying seed that contains dodder, or sowing on dodder-infested land. The dodder does not as a rule kill the plants, but stunts them, with the result that on poor land, in particular, the growth of sericea is so short it is not practicable to get rid of the dodder by mowing. On better land, where the growth of sericea is rapid, mowing holds the dodder in check but may not eradicate it. Pasturing is another means of control. Much can be accomplished by going over the field at intervals, beginning early in the season, and cutting off the dodder-infested plants with a sickle.

### THE SEED CROP

The seed crop of sericea may be harvested when 85 to 90 per cent of the hulls have turned brown. Cutting is done when the plants are somewhat damp, in order to prevent undue loss by shattering. If the mower is used, probably the swath should not be handled at time of cutting; that is, the crop should be allowed to lie as it falls to dry out. Afterward, it is raked into windrows and shocked, but the handling should be done only when the plants are "in case", as the tobacco grower says.

A small seed crop can be flailed out, which is readily done if the thoroughly dried and brittle crop is taken from the field and threshed at once. If stored in the barn for some time prior to threshing, enough moisture may be taken up to make the beating out of the seed a very difficult matter. A 10-mesh screen is very useful in getting rid of leaves and sticks prior to the use of a fanning mill, which is necessary in order to get clean seed.

Large crops are threshed with a grain thresher, which can be readily adjusted to give fairly satisfactory results. In particular, a suitable sieve should be inserted in order that the seeds may come out clean enough to be put through the huller without further treatment. In the absence of such a sieve, the seed are often badly mixed with leaves and sticks. The speed of the machine and the air supply must be carefully regulated from the outset to prevent loss of seed. It is also important to prevent any crowding of the machine, which should be fed uniformly; otherwise seed are liable to be carried over and lost.

For hulling and scarifying, a special machine, costing \$45.00 to \$135.00, is generally used. Such a machine requires a  $\frac{3}{4}$  H. P. electric motor or a  $1\frac{1}{2}$  H. P. gasoline motor.

It may be noted that seed hulled in threshing were found to have high germination and not to need further scarification.

## EXPERIENCE OF PRACTICAL FARMERS

A number of farmers scattered over the State have made trial of sericea both for hay and pasture. Their experience of two or three years has not been long enough for mature answers as to the value and place of this crop, but their observations are well worth consideration.

The first experience with sericea is often disappointing, owing to failure to get stands or because the growth of crabgrass or other weeds surpasses it the first year. Growers with sufficient patience to withhold judgment until the second year have been greatly encouraged by the remarkable vigor displayed by plants that made little growth the first year. As farmers learn more about how to get stands and more concerning the characteristics of sericea, they become enthusiastic about it.

Mr. J. M. Thompson, of Spring City, said he planted 3 ounces of sericea seed in February, 1932, and now has about 5 acres, most of which he mows for hay when about 18 inches high; harvesting the second crop for seed, for which he has found profitable sale. His stands were found to be excellent and nearly free from grass and weeds, with the exception of a patch which was seeded the year before at the last working of corn. A good stand was obtained, and it was expected to be nearly pure sericea next year. He keeps 3 work animals, a mare, and 2 milk cows, and finds the sericea straw worth while to help winter them. As to the hay, he said: "I find stock eat sericea hay as well as any average kind—about the same as Korean".

Mr. J. S. Millard, a farmer near Riceville, reports about 50 acres in sericea, which he has harvested for both early hay and a later seed crop. He considers the hay to be appreciably more valuable than grass hay, but somewhat lacking in palatability. Mr. Millard cuts his seed crop with a binder in the morning and threshes the only partly cured crop in the afternoon of the day cut. In this way he avoids much loss from shattering. He has found this method so satisfactory that he would not consider following any other. It appears very promising, and is recommended for trial by all who are in position to carry it out.

Professor V. F. Goddard has been growing sericea on his farm, near Maryville, since 1931 and now has about 30 acres in this crop. A 10-acre field seeded in 1932 produced in 1934 a total of 37½ loads of hay. In the past this field has produced only 10 or 12 loads of common grass and clover hay. He has one work team, 3 two-year-old colts, 3 milk cows, and 11 good-sized heifers. All have been fed sericea hay, and, without exception, have eaten it readily. In fact, one of the work animals when fed sericea hay and corn at the same time will eat the hay first. The heifers have maintained themselves

in excellent condition on sericea hay alone; that is, without grain or other concentrate. The cows giving milk receive only a light grain feed. The work stock when idle get only sericea hay.

Mr. S. E. Johnson, of Athens, Route 2, had about 12 acres in sericea and reported much the same experience as Mr. Thompson, having fed the hay to both cows and work stock, all of which ate it, he said, as readily as they did Korean hay. At the time of the visit, Mr. Johnson was threshing a seed crop from a field which had not been cut for hay that year, and remarked that the largest seed yields were obtained where the plants were left to grow throughout the season, but that the coarse stalks made threshing difficult. He found removal of the concaves advantageous in threshing. Like Mr. Thompson, he had an excellent stand from a seeding made at the last cultivation of corn.

Mr. L. M. LeCoultre, farm manager of the Blue Grass Dairy Farms, near Knoxville, reports about 50 acres of sericea, most of which was planted in the spring of 1933, and is preparing to sow more seed the coming season. He has fed the hay to both work stock and dairy animals, including heifers and cows in milk, with satisfactory results. In fact, he has been feeding the heifers exclusively on sericea hay during the winter and reports that they are in a thriving condition.

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