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# Forage Lespedeza

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There are three species of lespedeza seen in Arkansas – sericea, striate, and Korean. All three are warm-season, drought-tolerant, non-bloating legumes that are well-suited to the state's climate. They are useful for pasture, hay, soil conservation and wildlife habitat. They grow better on acidic, low fertility soils than most other legumes and produce most of their yield in July and August, when cool-season grasses and most clovers are semi-dormant. Lespedezas are adapted to most soils in Arkansas, but they are most productive on deep, fertile soils.

Lespedezas were introduced into the United States in the early 1900s and by the 1940s were planted on large acreages. However, lespedeza use dropped sharply when more productive legume species—such as red and white clovers—and fertilizers became widely available. Disease problems also contributed to the decline in lespedeza acreage. In addition, sericea lespedeza is considered a noxious weed in some states.

**Figure 1.** Sericea lespedeza is a popular legume for small ruminants. *Photo credit: Dr. Dan Quadros.*

However, interest in these forages is again increasing with the availability of improved varieties of sericea lespedeza. Because it is a leguminous plant, nitrogen fertilization is not required, and its deep root system results in better drought resistance than other forage crops. Lespedezas are of special interest to small ruminant producers because of perceived antiparasitic properties. Besides use as a forage, the soil conservation qualities of sericea lespedeza are outstanding. Sericea lespedeza is widely considered an invasive weed now and it is no longer commonly used on right of ways and was used to reclaim mining areas.

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## Sericea lespedeza

Sericea lespedeza (*Lespedeza cuneata*) is a deep-rooted perennial plant that is generally lower in quality than annual lespedezas because of its coarser stems and high tannin content. Tannin is the compound that confers the non-bloating characteristic to lespedeza, but it also decreases palatability and digestibility. However, varieties were developed in the late 20th century (Table 1) that have reduced tannin concentrations. These have greatly improved forage quality, finer stems and contain enough tannin to prevent bloat, but they yield less and are less persistent than high tannin varieties. Sericea lespedeza is the highest yielding and most drought tolerant of the lespedezas, and it tolerates the lowest pH and poorest soil. It grows from April through September and is killed back to the crown by hard frosts. Sericea is resistant to most diseases and has few insect pests, but it is susceptible to root-knot nematodes on light-textured soils. This species' reputation as an invasive species warrants caution. While diligent stockmanship can keep

**Table 1.** Lespedeza Species, Varieties, and Traits in Arkansas

| Lespedeza Species | Traits of the Variety |
|---|---|
| **Sericea** | |
| **Arlington** | Variety developed around 1950 by the Soil Conservation Service (SCS). |
| **AU Lotan** | Developed in Alabama, released 1980; tall; finestemmed; 50% less tannin, better digestibility, higher crude protein than other sericea varieties, but lower yields; good Rhizoctonia and rootknot nematode resistance. |
| **AU Donnelly** | Developed in Alabama; low tannin. |
| **AU Grazer** | Released in 1997, is a grazing tolerant species. This variety has fine stems, intermediate tannin levels, and good overall plant vigor. It is trademark protected by Auburn University. |
| **Cericea** | Released by the North Carolina Agricultural Experiment Station in 1972. Slightly better yielding than common sericea, with similar forage quality. |
| **Gasyn** | Released in 1963 from the Georgia Agricultural Experiment Station. Less tannin and smaller stems than common sericea. |
| **Interstate** | Developed in Alabama, released 1969; high tannin; highly branched, fine stems; shorter but more uniform than other sericea varieties. |
| **Interstate 76** | Developed in Alabama and Georgia, released 1978; high tannin; intermediate height between Serala and Interstate; good rootknot nematode resistance and, therefore, good adaptation to lighttextured soils. |
| **Serala** | Developed in Alabama, released 1962; improved variety with fine, soft stems; high tannin. |
| **Serala 76** | Developed in Alabama and Georgia, released 1978; better rootknot nematode resistance than Serala; high tannin. |
| **Striate** | |
| **Common** | A late maturing, unimproved type; less productive than Kobe; preferred to Kobe under continuous grazing management. |
| **Kobe** | Developed in Japan, introduced 1919; early maturity; large seed; grows from May 1 to November 1; larger, coarser and more upright than common; grows better in late summer than Korean; best hay yielder in south Arkansas; reaches early bloom the last week of September. |
| **Marion** | Developed in Arkansas and Missouri, released 1989; resistant to tar spot, southern blight and bacterial wilt; matures three weeks earlier than Kobe and one week later than Summit in north Arkansas; slightly lower yield than Kobe, but a much better seed producer; excellent natural reseeding ability; better leaf retention and forage quality during summer than other annual lespedezas; prostate growth habit wellsuited for grazing; can survive in bermudagrass mixtures. |
| **Korean** | |
| Korean | Unimproved type; reaches early bloom in late August. |
| Summit | Developed in Arkansas, released 1963; not recommended for southern Arkansas; matures a few days later than Korean; good bacterial wilt and tar spot resistance; consistent high yield; 60 percent more forage and seed yield than Korean; broader leaflets than Korean; seed hard to obtain. |

**Note:** 'Kobe' and Korean are the only annual lespedeza varieties commercially available currently. Common striate, 'Marion', and 'Summit' may still be present in some fields across the state.

this forage in check, stands can often take over undergrazed pastures. Sericea lespedeza can be controlled with summer applications of Remedy (triclopyr) or PastureGard (triclopyr + fluroxypyr).

## Annual lespedezas

### Striate Lespedeza

Striate lespedeza (*Kummerowia striata*) is an annual species and is sometimes called common lespedeza. 'Kobe' is a well-known variety of striate lespedeza. Striate lespedeza differs in appearance from the other annual species, Korean lespedeza. Striate lespedeza leaflets are narrower and its flowers and seeds are borne in leaf axils; whereas, Korean lespedeza flowers and seeds are found at the ends of stems where leaflets turn forward to form a conelike structure. Hairs on the stems of striate lespedeza point downward, while hairs on Korean lespedeza point upward. Striate seed is blotched in color, while Korean seed is black and shiny. Striate lespedeza flowers about three weeks later than Korean lespedeza and will not set seed until November. Plants are killed by hard frosts. If this occurs before seed matures, the crop may not produce enough seed to reseed itself. Undependable natural reseeding in areas prone to early frost has been the primary disadvantage of striate lespedeza in the northern parts of its range. Striate lespedeza has a prostrate growth habit, which makes it better suited for grazing than hay production.

### Korean Lespedeza

Korean lespedeza (*Kummerowia stipulacea*) is also an annual species that is killed by frost. Korean lespedeza seed matures earlier (October) than most varieties of striate lespedeza, which makes it more likely to reseed dependably in northern Arkansas or areas with early frosts. Korean lespedeza has a more upright growth habit, better drought tolerance, better response to lime and fertilizer, higher yield potential and reaches harvest stage earlier than striate lespedeza. However, it is extremely susceptible to bacterial wilt and tar spot. These diseases result in summer leaf loss and thinned stands and often cause Korean lespedeza to fail to attain its yield potential in Arkansas. Korean lespedeza is also less competitive with companion grasses than striate lespedeza.

**Figure 2.** Annual lespedezas are low-growing legumes adapted to poor soil fertility. *Photo credit: Dr. Hannah Wright-Smith.*

**Figure 3.** Flowers, leaflets, and stems of annual lespedeza. *Photo credit: Dr. Hannah Wright-Smith.*

## Establishment

Planting rate for sericea lespedeza is 20-30 lb per acre during late March to May. If the site to be planted has not grown lespedeza for more than three years, seed should be inoculated with *Bradyrhizobium* spp. from the cowpea miscellany cross-inoculation group. Emergence is very slow and seedlings are not competitive with other plants, so weed control will be needed. Winter annual grasses, tall fescue or orchardgrass can be drilled into established sericea stands to supply cool season grazing. Once established, sericea lespedeza stands are very competitive with weeds and companion grasses.

Some sources indicated somewhat lower seeding rates (15-20 lb per acre), but this is only possible with an incorporated pre-emergence herbicide. It is recommended to plant seeds into a well-prepared seedbed that was firmed with a cultipacker. The seeds should be planted using a cultipack-seeder combination, such as a Brillion seeder, or should be broadcast and not be covered with more than ¼ inch of soil. Seeding rates should be adjusted according to the predicted seed emergence percentage indicated on the seed bags. Weeds are considered a problem in first-year stands. Consult with local Extension agents for possible solutions as herbicide options vary Please consult the MP44 for more information.

Annual lespedezas can be planted from mid-February through mid (northern Arkansas) to late (southern Arkansas) April. Seedling development is day-length dependent, and plants will not produce much forage until June. Annual lespedezas (both striate and Korean) are planted at 25-35 lb per acre (broadcast) or 15-20 lb per acre (drilled). Higher rates are used for planting in pure stands, and lower rates are used for seeding in mixtures. Lespedeza seed does not store well, so test any seed that carries over to the next planting year for germination prior to planting. Please consult FSA3149 *How to Conduct a Seed Germination Test at Home* for more information. Do not plant seed that is more than two years old. If the site to be planted has not grown lespedeza for more than three years, seed should be inoculated with Bradyrhizobium spp. from the cowpea miscellany cross-inoculation group.

Annual lespedezas can be planted in combination with perennial cool-season grasses. If this is done, grass seedlings should be kept short through grazing or mowing to decrease competition with lespedeza. Lespedeza can be drilled into prepared seedbeds or , or overseeded onto wheat or perennial grass pastures. Overseeding on sods will be more successful if the sod is disked lightly prior to seeding to scarify the soil or if a harrow is dragged over the sod after planting. Cattle can be used to tread in seed, and heavy grazing in April and May will help decrease competition with grass while lespedeza seedlings are emerging. Sod seeding is the most prevalent method of establishing annual lespedeza in Arkansas. Please consult FSA3134 *Interseeding Clover and Legumes in Grass Sod* for more information.

Annual lespedezas are good legumes to grow in a double-cropping system with winter wheat. In this system, wheat should be sown thinly (1 bushel per acre) and fertilized with no more than 60 lb N per acre. Lespedeza is initially overseeded onto wheat in late winter. Wheat will provide weed control for the slow growing lespedeza seedlings during establishment. Early removal of the wheat as pasture, silage or hay will help the lespedeza. The lespedeza will grow during summer and can be grazed or harvested for hay. Fall disking – after the lespedeza crop is removed – and in preparation for planting the next wheat crop covers the shattered lespedeza seed to help ensure a good stand of lespedeza the following spring.

Striate lespedeza can be susceptible to many herbicides commonly used for pasture weed control, especially dicamba and metsulfuron. Korean lespedeza is sensitive to 2,4-D. Avoid applications of these herbicides to lespedeza seedlings less than 4 inches tall or to plants on which flower buds have formed.

## Stand management

Lespedeza will grow on soils with pH as low as 5.0, but productivity does respond to lime applications. Optimal pH for lespedeza production is 5.5 to 6.0. Lespedeza will often respond to P fertilization, and K fertilization may increase yields if pH and P fertility are adequate. Pure stands of lespedeza do not respond to N fertilizer when soil P and K are adequate. Fertilization with N will strongly favor grass production in grass-lespedeza mixtures. To help ensure survival of the lespedeza component, fertilization of grass-lespedeza mixtures should be limited to 30 lb N per acre per year.

Annual lespedezas have strong volunteer reseeding potential in Arkansas. Plants should be allowed to set seed in September, October and November to ensure a good stand the following year. Reduce grazing pressure during these months to allow plants to set seed. Lespedeza seed contains a high percentage of hard seed. Hard seed is dormant when first produced and can survive in the soil to germinate in following years. When hard seed is produced on branches that escape harvest by being close to the ground, natural reseeding is encouraged. Shatter during combining will probably be sufficient to ensure reseeding of stands harvested for seed.

Once established, lespedeza species are competitive against weeds, and grazing or cutting early in the summer will allow lespedeza to outcompete surrounding weeds. There are few herbicides that will not significantly injure or kill lespedeza and should only be used if injury can be tolerated. Applications of glyphosate can be used to control winter weeds in warm-season pastures.

All lespedezas are relatively free of insect pest problems. Dodder, a pale yellow, parasitic vine with no leaves, may present a weed control problem in some fields. Dodder seed is often found as a contaminant in lespedeza seed. Dodder-infested areas of fields intended for seed production should be burned or destroyed to prevent dodder from contaminating lespedeza seed. Disease problems are best combated by selecting resistant varieties.

## Hay

Lespedezas make excellent hay. Because the fine stems do not contain much water and the proportion of leaf is high in improved varieties, they cure quickly and can be cut, dried and baled on the same day under ideal conditions. Leaves will shatter easily if overdried. Lespedeza can be mowed, windrowed and conditioned in the same operation to minimize leaf loss. Use of tedders and rakes on nearly dry lespedeza should be avoided. Baling will also cause excessive leaf loss if the lespedeza is too dry – baling when a dew is present may minimize this problem. Properly baled lespedeza hay should contain 55 percent leaf.

Annual lespedeza should be cut for hay when plants are at 30 percent bloom, reach 12 to 15 inches in height or start to drop their leaves. Pure stands of annual lespedeza can potentially yield 1 to 4 tons of hay per acre, depending on site, weather conditions and number of harvests. Stands should produce about 1 ton of hay for every 4 to 5 inches of growth above the cutter bar at harvest.

Annual lespedezas generally do not exhibit vigorous regrowth. Because annual lespedeza stores very little energy in its roots, a 3 inch

stubble with leaves should be left to encourage regrowth after a hay crop is removed. Annual lespedeza can be cut twice for hay under adequate moisture conditions if the first cutting is made when plants are less than 8 inches tall. However, research with irrigated annual lespedeza in Missouri showed that taking just one hay cutting in August or October yielded almost twice as much total forage as did two cuttings in July and October.

Palatability and forage intake of high-tannin sericea lespedeza varieties are higher for hay than for fresh forage. Sericea lespedeza hay should be cut no later than at the early bloom stage of development. If stems break readily when bent, the crop is too mature to make high-quality hay. Harvesting at later stages of maturity will produce more yields but at the expense of less leaf and lower forage quality. Because regrowth comes from buds on the stubble, at least 4 inches of stubble should be left after cutting. It is usually possible to get two hay cuttings from sericea lespedeza in Arkansas. Plants should not be harvested between mid-August and the first killing frost to allow plants to accumulate energy reserves to use during winter. After a killing frost, the remaining forage can be cut or grazed without harming the stand.

## Grazing

Annual lespedeza makes excellent pasture in July, August and September when fescue productivity is low. Low-growing, prostrate striate lespedeza varieties are most tolerant of grazing. For best results, annual lespedeza should be rotationally grazed when plants are 4 to 6 inches tall and grazed no closer than 2 inches. Lespedeza must not be overgrazed early in the season, or regrowth potential will be decreased during summer. Pastures should be grazed lightly or rested in September, October and November to help ensure good reseeding.

It is difficult to keep lespedeza in sods with vigorous permanent grasses like bermudagrass. 'Marion' striate lespedeza has shown some ability to persist in Arkansas bermudagrass pastures, and sericea lespedeza has been successfully maintained in bahiagrass pastures in Mississippi. Lespedeza is more compatible with cool-season bunchgrasses like tall fescue or orchardgrass. When grown with these grasses, spring forage is likely to be mostly grass and summer forage will be mostly lespedeza. If lespedeza is crowded out by the grasses, it can be restored by disking the sod and overseeding with lespedeza every third year.

Annual lespedeza is excellent feed for stocker cattle. Near Batesville, Arkansas, yearling cattle stocked at 1.1 to 1.5 animal units/acre gained 1.8 lb/day over an 80-day grazing period in late summer. In Missouri, wheat lespedeza pastures produced 285 lb of beef per acre with average daily gains of 1.7 lb/day. Annual lespedeza is also a good forage for dairy heifers and horses. Annual lespedeza usually contains 10 to 16 percent crude protein.

Sericea lespedeza can be grazed when a height of 8 to 10 inches is reached, and a 4-inch stubble should be left between grazings. Sericea lespedeza should not be allowed to become mature and coarse when pastured, or animals will not eat it readily. Sericea tests slightly lower in crude protein than annual lespedezas. Maintaining lespedeza stands in a vegetative state is critical to accruing the full benefits of these species. A 2022 study in western Virginia found that cattle selected a suite of broadleaf weeds and tall fescue rather than sericea lespedeza when pastures were lightly and continuously stocked.

## Small ruminants

The applications and benefits of forage lespedezas are more likely to benefit small ruminant farmers than cattle producers.

Small ruminants have a higher preference for lespedezas than cattle. Tannins are more desirable in parasite-prone small ruminants. Additionally, sheep and goats consume higher proportions of legumes and broadleaf forbs than cattle and are thus more likely to keep the stand in a vegetative state.

Pelleted sericea lespedeza is somewhat available through a handful of distributors in the southeastern USA. Sellers claim that these pellets offer the same antiparasitic benefits of hayed or grazed sericea lespedeza. Pellets may be a part of a supplementation program, but planting or maintaining an existing stand is more likely to be cost effective for Arkansas farmers.

While any lespedeza can be a strong component of a small ruminant farm, these species are limited to growth in the summer months. Complementary cool- and warm-season grasses, clovers, and even brassicas can fill forage gaps to build a program of nearly year-round grazing. Please consult FSA 3139 Arkansas 300 Days Grazing System – Getting Started for more information.

## Seed production

Sericea lespedeza typically yields 200 to 400 lb seed/acre. Korean lespedeza yields about 300 lb seed/acre. Striate lespedeza normally yields 100 to 250 lb seed/acre, but Marion has yielded a record 1,900 lb seed/acre in Arkansas.

Annual lespedeza grown for seed can be planted in rows or broadcast. Rows require less planting seed, allow cultivation and are easier to rogue for off-type plants. However, plants grow closer to the ground in rows, making seed harder to harvest.

When soil moisture is adequate, annual lespedeza may be planted as late as early June in Arkansas if intended solely for seed production. It is possible to harvest both hay and seed from the same stand if the crop is planted early and the hay crop is cut when plants are only 7 inches tall, leaving a 3inch stubble. Research in Missouri showed that taking hay crops from Summit and Marion lespedeza after mid-June decreased seed yields. Korean lespedeza intended solely for seed is sometimes top-clipped early in the season to encourage branching and higher seed production.

Sericea lespedeza seed yields are usually highest if the crop is not harvested for forage during that year.

Lespedeza seed is usually combined directly when seeds and pods have turned brown but can be harvested by using windrows and a pickup device on the combine. Pods of both annual lespedezas shatter very easily, and striate lespedeza shatters more readily than Korean. Harvesting when dew is present helps reduce shattering losses. It is also important to harvest the seed at the right time. A delay of three weeks in harvesting can mean a loss of 50 percent or more of the seed due to shattering. Seed can be harvested before it is completely dry to minimize shattering, but seed will then need to be dried to maintain viability.

Freshly harvested lespedeza seed may contain 50 percent hard (dormant) seed, but the hardness decreases naturally to about 10 percent dormancy by February.

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