Sericea Lespedeza

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Sericea lespedeza [*Lespedeza cuneata* (Dumont) G. Don] is a widely-adapted, non-bloating warm season perennial legume that can be used for grazing, hay, or as a conservation plant. It is a deep rooted plant that although it does best on deep, well-drained upland soils, it can be grown on a wide range of soil types and sites. It is particularly well adapted to acid, infertile soils commonly found in the southeast of the USA. Sericea lespedeza is tolerant of aluminum-toxic conditions; therefore, it is especially valuable in soils with a pH below 5.0 where aluminum toxicity is a problem.

History of Sericea Lespedeza

Sericea lespedeza became one of the most commonly used species for planting on strip mine spoils, road banks, and other disturbed or eroding areas. The widespread efforts to conserve soils in the 1930's through 1950's used the sericea lespedeza plant material available at the time. That was the cultivars Arlington, released in 1939, and Okinawa that was made available in 1944 (but was not formally released), both of which have very thick stems. Auburn University started a breeding program in the 1950's aimed at improving some of the characteristics of the sericea plant. The improved cultivars of sericea lespedeza (Serala and Interstate), released by Auburn University in the 1960's, continued to play a major role in conservation of natural resources in the Southeast. Disturbed soils from surface-mined coal sites were stabilized by planting sericea lespedeza, a practice that continues up to now.

Sericea lespedeza was seen as low quality forage because of frequent but not always poor animal performance. Poor animal performance was ascribed to low nutrient intake caused by low palatability and low digestibility of sericea lespedeza forage. Low palatability has been thought to be due to high tannin content and to coarse, thick stems. At the time it was recognized that over-mature plants were a major problem affecting forage palatability and quality. The recommendation was to graze the plants when they were less than 15 cm (6 in) tall, but it was acknowledged to be unrealistic because of reduced stand longevity. The development of the cultivar AU Grazer™, released in 1997 by the Ala. Ag. Expt. Station and Auburn University, represented a turning point for the crop. AU Grazer™ is the cultivar that was selected under grazing conditions and is the first cultivar tolerant to grazing.

Many pharmaceutical anthelmintics for ruminants have become ineffective due to increased gastrointestinal parasite resistance worldwide. Cooperative research conducted by Fort Valley State University, Louisiana State University, the USDA-ARS-Arkansas and Auburn University with the cultivar AU Grazer™ determined that the small ruminant industry can feed AU Grazer™ to protect animals against internal parasites that cause economic damage and animal death. Research has demonstrated that feeding sericea lespedeza is particularly effective against infection by the barber's pole worm *Haemonchus contortus* and has other positive effects on ruminants and the environment. This plant benefits the health of ruminants because besides

helping to reduce gastrointestinal parasites, it is effective in reducing protein degradation, improves nutrition and prevents bloating.

ACSRPC Sericea Lespedeza Research

The anti-parasitic properties of sericea lespedeza were first documented in grazing trials with goats in Oklahoma (Min et al., 2003; 2004) and with hay-feeding trials with goats in Georgia (Shaik et al., 2004; 2006) and sheep in Louisiana (Lange et al., 2006). The anthelmintic effect of sericea hay was unexpected because of earlier work showing that drying of this forage reduced its content of extractable condensed tannins and improved intake in sheep (Terrill et al., 1989). In fact, the initial trial, completed in Georgia in fall, 2003, in which ground AU Grazer™ lespedeza and bermudagrass [*Cynodon dactylon* (L.) Pers.] hays were fed as 75% of the diet to parasitized goats (25% grain-based supplement), was only completed because of unavailability of sericea grazing paddocks at Fort Valley State University. To our surprise, the sericea-fed goats had significantly lower fecal egg counts (FEC) than the goats given the bermudagrass diet. In a follow-up study with uncut hay, FEC of goats fed sericea were 80% lower than control animals 7 days after feeding was started, and this difference was maintained throughout the 6-week trial. The sericea-fed goats also had 70% less adult *H. contortus* in their abomasum than goats on the bermudagrass hay diet. Numbers of small intestinal worms (*Trichostrongylus colubriformis*) were also lower in these animals, as well as the percentage of parasite eggs successfully developing into larvae (Shaik et al., 2006). Similar results were reported in a sheep trial completed around the same time in Louisiana (Lange et al., 2006), with FEC reductions of 67-98% in the sheep fed a sericea diet compared with control animals.

Since these initial sericea lespedeza hay trials, subsequent experiments have included evaluation of ground sericea leaf meal and pellets as the primary diet and as a supplemental feed for goats and sheep grazing grass pastures, and grazing trials with sericea, both in pure stands and in mixed sericea-grass pastures (Terrill et al., 2012). Additional tests of the anti-parasitic effectiveness of sericea lespedeza in combination with other novel GIN management strategies, including use of FAMACHA© (Miller et al., 2011) and copper oxide wire particles (Burke et al., 2010) have also been completed. Over the past 10 years, in every experiment in which *H. contortus* was the dominant GIN in sheep and goats, there has been a positive anti-parasitic effect of feeding or grazing sericea lespedeza, with either reduced FEC, lower adult worm numbers in the abomasum, or both (Terrill et al., 2012). The level of GIN reduction that has been reported for sericea compared with non-tannin diets, up to 98% for FEC (Lange et al., 2006), and 94% for adult *H. contortus* (Min et al., 2003), is often 2-3 times higher than that reported for other anti-parasitic plants. The reason for this is not completely clear, but may be related to the type of condensed tannin in sericea lespedeza, which is a more reactive type than other plant tannins, possibly allowing it to interact directly with the adult nematode in the abomasum. Evidence of this was recently provided by scanning electron micrographs of female *H. contortus* recovered from the abomasum of goats fed pelleted diets containing sericea lespedeza leaf meal or non-sericea commercial pellets. The worms from the goats fed sericea had a shrunken, shriveled appearance, while the control animal worms looked smooth (Kommuru et al., 2012).

Although sericea lespedeza has been most consistently effective against the blood-feeding *H. contortus*, the primary GIN infecting goats and sheep throughout the tropics and subtropics worldwide, sericea has also shown some anti-parasitic properties against other GIN as well,

including adult *T. colubriformis* (40% reduction) and *Ostertagia circumcincta* (26% reduction) (Shaik et al., 2006). The anti-parasitic effectiveness of this plant is also not limited to sheep and goats, as similar effects have been observed in llamas (Gillespie et al., unpublished data) and beef cattle (Terrill et al., unpublished data). Another exciting recent development with this forage is its high efficacy (up to 98%) against the small intestinal parasite coccidia (*Eimeria* spp.) in both sheep (Burke et al., 2013) and goats (Terrill et al., unpublished data). Another livestock species for which infection with coccidia can be a major health issue is poultry, and sericea may also offer a potential alternative to commercial coccidiostats for this industry.

Future of Sericea Lespedeza

With a sericea leaf meal pellet now commercially available (Sims Brothers Seed Company, Union Springs, AL; www.simsbrothers.com), the use of sericea lespedeza as a nutritional/anti-parasitic feed supplement by small and large ruminant producers is likely to continue growing. Sericea has a tremendous advantage over many other tannin-containing plants, which is that it is already well-established as a forage for hay and grazing in the U.S., as well as in other parts of the world, such as South Africa. With its many agronomic advantages, including tolerance of acid, infertile soils, drought tolerance once established, and grazing tolerance (AU Grazer™), combined with benefits for animal health (anti-bloat, anti-parasitic, good nutritional quality) and the environment (reduced methane production in livestock; Puchala et al., 2005), the future of sericea lespedeza in agriculture looks very bright indeed.

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