The Effects of Outcrossing on Forage and Seed Yields in Sericea Lespedeza, *L. cuneata*¹

E. D. Donnelly²

SERICEA lespedeza, *L. cuneata*, is a perennial legume grown widely in the Southeast for hay and grazing. There are over one-half million acres of this crop in Alabama alone. It produces forage during the hot, dry summer months on eroded soils that are low in fertility, and there are no major diseases that limit its production or reduce its persistence. However, it is comparatively low in nutritive value and palatability. There are possibilities for improving these characteristics through plant breeding. Relatively little breeding work had been done with sericea; and, before the most effective breeding method for improving this crop can be determined, the effects of inbreeding and outcrossing must be known.

This study was conducted to determine whether there are increases in forage and seed yields from hybrid seed of sericea and, if so, the magnitude of the increases.

**REVIEW OF LITERATURE**

Sericea produces both apetalous and petaliferous flowers³. The apetalous flowers are cleistogamous and the petaliferous are chasmogamous. All apetalous flowers are naturally self-pollinated, and petaliferous flowers may be naturally either self- or cross-pollinated⁴. Stitt⁴, using procumbent growth habit as a genetic marker, found that 70.4% of the seed from petaliferous flowers resulted from cross-pollinations. McKee and Hyland⁵ found that seed from the two kinds of flowers produced by sericea can be differentiated on the basis of pod shape. They observed that seed from the two types of flowers produced similar plants. However, in *L. laissima* the plants were quite dissimilar in amount and manner of growth. Plants from seed of apetalous flowers were much smaller and more prostrate than those from petaliferous flowers. Cursory observations made by Stitt⁴ revealed no variation in size or vigor between the mother plant and selfed or open-pollinated generations of sericea.

McKee and Hyland⁵ found that the percentage of the two flower forms varied from year to year depending on the environment. Sericea produced 75% of the seed from petaliferous flowers in 1939 and only 31% in 1940. They associated short days and low light intensity with the formation of apetalous flowers. Hanson⁶ found this association in *L. stipulacea* and obtained predominantly apetalous flowers at 70°F.

**MATERIALS AND METHODS**

In the spring of 1951, 300 seed from apetalous flowers and 300 from petaliferous flowers were separated from randomly chosen individual plants of commercial sericea. A separation was made on the basis of pod shape. Each plant was cut from each plant was planted in 1-row plots in 3 randomized blocks. One hundred seed were planted per plot. A commercial sericea that included seed from apetalous flowers was planted, making a total of 21 entries. The test was conducted on a fertile river terrace soil. Excellent stands were obtained. Rows were 10 feet long and 20 inches apart. There was a distance of 1 foot between replications. The plots were made in 1952 and in 1953, making a total of 20 plots. No hay cutting was made in 1954; instead, the plots were harvested. Stand counts were made following harvest.

**RESULTS AND DISCUSSION**

**Forage Yields**

Forage yields were subjected to analysis of variance. A significant interaction, families × types of progeny, was indicated, indicating that the types of progeny had a greater effect on forage yields in the 10 families. Chasmogamous progeny were significantly higher than the cleistogamous progeny at the 1% level, and a highly significant difference was indicated among families. The yield of the commercial check was not significantly different from the average yield of the 10 families.

For a 2-year period the chasmogamous progeny producing 6,428 pounds of dry herbage per acre compared with 5,134 pounds for the cleistogamous progeny, an increase of 1,294 pounds or 25% (table 1). The increase of this increase between types of progeny was 41%, indicating considerable differences in the general combining ability and/or in the amount of cross-pollination of the petaliferous flowers among the families. The average forage yield of the commercial check for the period was 5,780 pounds, compared with the yield of the 10 families. Yields of the chasmogamous and cleistogamous progenies were significantly higher than yields of the cleistogamous progenies of the 10 families.

**Seed Yields**

Analysis of variance of seed yields showed a highly significant interaction, families × types of progeny, was indicated, indicating that the types of progeny yielded differently in the 10 families. Yields of the chasmogamous progenies were significantly higher than yields of the cleistogamous progenies of the 10 families. No hay cutting was made in 1954; instead, the plots were harvested. Stand counts were made following harvest.

¹ Received May 2, 1955.