Heritability Estimates and Correlations of Yield and Certain Morphological and Chemical Components of Forage Quality in Sericea Lespedeza

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SERICEA, Lespedeza cuneata (Dum. de Cours.) G. Don, is recognized as a low quality forage crop. Present production is limited to vigorous, hardy commercial strains developed with no selection for forage quality. Studies on components of quality in sericea have indicated two broad groups of characters: morphological characters related to animal intake and chemical constituents related to either intake or nutritive value. Palatability is at least partly related to stem and leaf characteristics. Donnelly (4) has shown the preference of beef steers for plants with fine, pliable stems. In further studies (8) it was found that rabbits consumed more of the fine-stemmed than coarse-stemmed types. High intake and digestibility of the fine-stemmed sericea were associated with higher total digestible nutrients, crude fiber, and nitrogen-free extract.

Nutritional value of forages is related to chemical components which in themselves may be limiting in quantity or quality or else directly detrimental to digestion or other physiological processes. In sericea, protein quantity and quality are examples of limiting components (7), while tannin, which interferes with intake and probably with digestibility, is an example of detrimental components (12).

In breeding forage species for quality, refinements are needed in methods of measuring and determining the effects of both morphological and chemical characters. Chemical analyses are too expensive for wide scale screening of the necessary constituents. Determining the critical components is the first step in evaluating breeding stocks. Interrelationships among the critical components or among one or more of them and other easily measured characters may allow for more efficient measurement and selection procedures prior to the ultimate test of animal performance. Associations which would limit the need for chemical analyses would be of great value.

This study concerns the inheritance of yield, tannin, and certain other chemical and morphological characters related to quality in sericea lespedeza. Since leaf tannin content has received considerable attention in relation to sericea quality, the relationship of tannin to other characters is of primary interest.

MATERIALS AND METHODS

In 1957, the first 50 plants from a larger group being analyzed for tannin content were also analyzed for CaO, MgO, K2O, P2O5, and total N (as a measure of crude protein). These plants represented the range of genetic diversity in the sericea breeding nursery at Clayton, N. C. The plants were spaced at 3.5 X 3.5 feet for cultivation and were in the second growing season. The soil was a Chesterfield gravelly sandy loam, limed to approximately pH 6.0, and fertilized annually with 500 pounds per acre of 0-14-14 fertilizer (0-6.1-11.6 in N, P, K). Individual plants were harvested May 29, 1957, dried with forced hot air, and weighed, and the leaves were separated from the stems. All chemical analyses were made on the leaves. Chemical analyses, with the exception of that for tannin, were made by official methods (1). Tannin analyses were made by a modification of the formaldehyde hydrochloric acid precipitation method, reported by Hanson et al. (9). Intra-plant correlations of tannin and yield with each of the other characters were calculated.

In 1959, five plants were taken at random from each of 20

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