Inheritance of Flower Color, Resistance to Powdery Mildew, and Other Characters in Korean Lespedeza

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KOREAN lespedeza (Lespedeza stipulacea) is a major summer-annual forage legume in the belt extending from eastern Kansas and Oklahoma, and southern Iowa eastward to the Atlantic seaboard. The crop is widely grown and much has been written regarding its culture and utilization. There is little published information, however, relating to the genetics of this plant. The literature contains chromosome counts for many species in the genus but no reports of inheritance studies. The latter reflects, to a large extent, the difficulties which have been encountered in crossing. Recently a successful technique for obtaining hybrids in Korean lespedeza was described (2). That study led to the present investigation, which was undertaken to determine the inheritance of five traits, insofar as F2 data would permit, in certain crosses derived from the earlier study. The characters studied were: Flower color, reaction to powdery mildew, date of first bloom, growth habit, and erectness of main stem.

MATERIALS AND METHODS

The parent strains, code letters, and the characters investigated are shown in table 1. To simplify presentation, further reference to the strains will be by code letters. Each of them originated as a single plant selection. Strains A, B and C were selected from P. I. 116,138, a seed lot obtained in 1936 from China by the Division of Plant Exploration and Introduction. The others are of commercial Korean origin and have probably evolved from the introduction from Seoul, Korea, reported by Pieters and Van Eseltine (5). All of the strains were considered to be well adapted in North Carolina.

The hybrids selected for this study were A × B, A × G, A × R, and C × D. In each cross the pale flower character occurred in the female parent and purplish red in the male parent. For one restriction placed on the selection of F1 hybrids in order to obviate classification difficulties arising from omission in the crossing procedure. The "true-hybrids" fractions could be readily recognized in the first year, whereas difficulty was encountered in classifying the progenies from the reciprocal cross and those from crosses of strains of similar flower color.

All plants were established in the greenhouse and transplanted to the field when the seedlings were 10 inches in height. The F1's were grown during 1949 and the F2's in 1950. The parents were grown in each year for purposes of uniformity and for establishing some of the standards. The hybrid progenies were scored. The individual scores were as follows:

- **Flower color.**—Scoring was on the basis of 1-2, representing pale and purplish red, respectively.

- **Reaction to powdery mildew.**—This character was scored on the basis of 1 to 4, the scores corresponding to resistant, moderately susceptible, and susceptible. Infection was from naturally occurring epiphytotics.

- **Date of first bloom.**—Plants were scored as to when first bloom had appeared by Aug. 22. An attempt had been made to establish a more comprehensive system of classification but it was discovered that only an occasional flower was formed on any one individual during the first ten days of flowering. Attention was paid to lateral branches. The behavior of the main stems was disregarded in scoring for growth habit.

- **Erectness of main stem.**—This character was scored with an improvised protractor with a radius of 7 inches. The horizontal axis at which the main stem intersected the protractor was taken as a measure of erectness.

Frequency distributions were constructed for characters except flowering date. Erectness of main stem (degrees) was sampled at 10 degree intervals from the most procumbent to the most upright individual. In case distributions for a particular trait were obtained from crosses, the X2 test for homogeneity was conducted on a row × column contingency table for crosses among the parents to determine whether the crosses could be pooled. The tests used to detect linkages and other associations conditioning the various characters. Before processing for independence, the data for each of these were grouped into classes of scores as follows: Flower color, 1-2, 3, 4-5; growth habit, 1-3, 4-5, 6-9; erectness of main stem, 1-3, 4-5, 6-9.

Table 1.—Parent strains, code letters, and characters used in inheritance studies.

<table>
<thead>
<tr>
<th>Variety or strain</th>
<th>Code letter</th>
<th>Flower color*</th>
<th>Powdery mildew</th>
<th>Date of first bloom</th>
<th>Growth habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. G. 31856</td>
<td>A</td>
<td>pale purplish red</td>
<td>resistant</td>
<td>Aug. 30</td>
<td>erect</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>moderate purplish red</td>
<td>susceptible</td>
<td>Aug. 25</td>
<td>procumbent</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>pale purplish pink</td>
<td>resistant</td>
<td>Aug. 31</td>
<td>erect</td>
</tr>
</tbody>
</table>

* Refers to the area of the standard petal beyond the deep purplish red spot at the base of the flower.