A STUDY IN THE GENETICS OF SEED COAT
COLOUR IN CANAVALIA ENSIFORMIS D.C.

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Introduction

Genetically worthless in a number of the published works on gourds, the natural color variety has been noted. Natural outcrossing is evidently rare and from isolated pure lines. Using these pure lines as parents, crosses were made with a view to investigating the genetics of seed coat color.

Seed coat color is a maternal character and hence it is necessary to produce two complete generations. In the time available it has only been possible to obtain F1 data.

2. MATERIALS AND METHODS

Four true-breeding types of seed-coat color have been isolated namely:

Type A having a white seed-coat i.e. the normal type.

Type B having a grey seed-coat differing from Type A in having a very small and more narrow B, and is of which by cut the latter.

Type C having a white seed coat with Arenum nucleus and a brown ellipse on the hilum.

Type D having a brown seed coat and a large white hilum ellipse.

Type B is known to be acker, and the normal type resembles C in seed coat, was shown to be a hybrid C x A.

The hybrids available in the investigation were-

A1 x B  D x A /  E x A
A1 x C  D x C /  E x C
A1 x D

No hybrid B x C was attempted.
1. INTRODUCTION

*Canavalia ensiformis* D.C. is a member of the papilionate Leguminosae. The genus is pan-tropical and *C. ensiformis* is widely grown as a cover crop. The bean may be eaten if the bitter testa is removed. The normal colour of the seed coat is white but coloured variants have been noted. Natural outcrossing is evidently rare and from a mixed population K. Shepherd (unpublished) isolated pure lines. Using these pure lines as parents, crosses were made with a view to investigating the genetics of seed coat colour.

Seed coat colour is a maternal character and hence it is necessary to produce two complete generations. In the time available it has only been possible to obtain F1 data.

2. MATERIALS AND METHODS

Four true-breeding types of seed-coat colour have been isolated namely:

- **Type A** having a white seed-coat i.e. the normal type.
- Two cultures of A were found to differ in mean seed weight and were termed A1 and A2, of which A1 was the larger.
- **Type B** having a white seed-coat with brown spots and a brown ellipse round the hilum.
- **Type C** has a brown seed coat with a large white hilum ellipse.
- **Type D** is brown tending to be darker near the hilum. A further type resembling C to some extent was shown to be a hybrid C x A.

The hybrids available in the investigation were:

- A1 x B
- B x A1
- C x A
- D x B
- A1 x C
- B x A2
- C x D
- A1 x D

No hybrid B x C was available.
3. RESULTS

The hybrids obtained were found to be somewhat impure but in many cases the true F1s are identifiable with some confidence.

The mean seed weights of A1 and A2 are lower in 1954 than in 1953. The difference between the mean seed weights of A1 and A2 is greater in 1954 than in 1953.

A spontaneous hybrid indistinguishable from the C x A hybrid was found to segregate. In the progeny were types C and A and also the hybrid type.

4. DISCUSSION AND RECOMMENDATIONS

The F2 generation should produce data as regards the number of genes involved in determining any given seed coat colour. It seems probable, bearing in mind the spontaneous hybrid data mentioned above, that single gene characters are involved. From the data presented in Table 1 it can be seen that partial or complete dominance may occur.

The data on mean seed weight confirm the existence of the two races of A.

A new series of F1s are being prepared including B x C. These new F1s should confirm data which will be obtained from the current series. It is necessary to raise two generations to obtain complete data and it is suggested that these be planted in early August to be available in late September.
The results obtained are set out in the table below.

### Table 1: F1 data

<table>
<thead>
<tr>
<th>Female parent</th>
<th>Male parent</th>
<th>F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 white</td>
<td>B spotted</td>
<td>spotted</td>
</tr>
<tr>
<td>A1 white</td>
<td>C white ellipse</td>
<td>intermediate</td>
</tr>
<tr>
<td>A1 white</td>
<td>D brown</td>
<td>brown</td>
</tr>
<tr>
<td>B spotted</td>
<td>A1 white</td>
<td>spotted</td>
</tr>
<tr>
<td>B spotted</td>
<td>A2 white</td>
<td>&quot;</td>
</tr>
<tr>
<td>C white ellipse</td>
<td>A2 white</td>
<td>intermediate</td>
</tr>
<tr>
<td>C white ellipse</td>
<td>D brown</td>
<td>brown</td>
</tr>
<tr>
<td>D brown</td>
<td>B spotted</td>
<td>spotted</td>
</tr>
</tbody>
</table>

**Note.** The intermediate F1s C x A and A x C have a brown seed coat streaked with white and a white hilum ellipse, i.e. they are intermediate but resemble C more strongly than A.

A sample of seed of A1 and A2 was taken and weighed in both 1953 and 1954.

### Table 2: Seed weights of A1 and A2

<table>
<thead>
<tr>
<th>Year</th>
<th>A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>mean 2.0 gms. of 60 weighed.</td>
<td>mean 1.8 gms. of 67 weighed.</td>
</tr>
<tr>
<td>1954</td>
<td>mean 1.6 gms. of 143 weighed.</td>
<td>mean 1.2 gms. of 94 weighed.</td>
</tr>
</tbody>
</table>

4. **SUMMARY**

Variations in seed coat colour have been outlined and F1 data presented.