LINKAGE BETWEEN PURPLE LEAF-SHEATH COLOUR AND JUICINESS OF STALK IN SORGHUM.

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Sorghum leaf-sheaths are either purple in colour or brown (devoid of purple) (Fig. 1). Purple (PP) is a simple dominant to brown (pp) (Rangaswami Ayyangar, et al., 1933).

Sorghum stalks may be pithy or juicy. When pithy, the midribs of the leaves have a white colour and when juicy, the midrib is of a dull leaden colour (Fig. 2). A pithy stalk, indicated by the white midrib of the leaf (DD), has been found to be a simple dominant to a juicy stalk with a dull midrib (dd) (Rangaswami Ayyangar, et al., 1936).

The Talai virichan cholam of Coimbatore (Sorghum Roxburghii var. hians Stapf) is a coarse sorghum whose stalks are always pithy (juice extraction about 13%) and whose leaves have therefore white midribs. In this Talai virichan cholam, brown sheathed plants and varieties are met with in very large numbers.

The Tella jonna of Bellary belongs to the group S. cernuum Host and is typical of it. It is juicy with an extraction of about 40%. Its leaf has a markedly dull midrib. Its straw is reputed as fodder. Evolved in the black soils of the Deccan uplands this Tella jonna does not fare well under Coimbatore conditions. It was therefore designed to make crosses between Talai virichan cholam (S. Roxburghii var. hians Stapf) and the Tella jonna of Bellary (S. cernuum Host) with a view to tone up the fodder value of the former.

The following parents were chosen and were crossed—Cross No. A. S. CXXV.
The first generation plants had purple leaf-sheaths and white midribs. In the second generation if there had been independent assortment of the factors for leaf-sheath colour and midrib colour, four groups of plants differing in leaf-sheath colour and midrib colour, viz., purple sheath and white midrib, purple sheath and dull midrib, brown sheath and white midrib, and brown sheath and dull midrib, would have been obtained in the ratio of 9 : 3 : 3 : 1.

The $F_2$ generation however gave the following numbers in the four groups:

Cross No. A.S. CXXV—$F_2$ Generation.

<table>
<thead>
<tr>
<th>Family No.</th>
<th>Leaf-sheath $\rightarrow$</th>
<th>Purple</th>
<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leaf midrib $\rightarrow$</td>
<td>White</td>
<td>Dull</td>
</tr>
<tr>
<td>A.S. 3434</td>
<td>..</td>
<td>98</td>
<td>39</td>
</tr>
<tr>
<td>,, 3435</td>
<td>..</td>
<td>84</td>
<td>32</td>
</tr>
<tr>
<td>,, 3914</td>
<td>..</td>
<td>151</td>
<td>51</td>
</tr>
<tr>
<td>,, 3915</td>
<td>..</td>
<td>168</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td>..</td>
<td>501</td>
<td>184</td>
</tr>
<tr>
<td>Calculated (9 : 3 : 3 : 1)</td>
<td>..</td>
<td>501.3</td>
<td>167.1</td>
</tr>
</tbody>
</table>

$\chi^2 = 31.69$; $P > .01$.

The high value of $\chi^2$ shows that the distribution of the four groups does not conform to the normal di-hybrid ratio. Such a distribution of the four groups as that obtained above can be explained only on the assumption
Purple
Leaf-sheath

Brown

White
(Pithy stalks)

Dull
(Juicy stalks)

Leaf midrib
of a linkage between the factor $P$, for purple leaf-sheath colour and the factor $D$, for juiciness of stalk (midrib colour).

On this assumption the recombination percentage was worked out and gave the value of $30 \pm 1.8$, in the repulsion phase.

On the assumption of linkage with a recombination percentage of 30, the expected distribution of the four groups of plants is as follows:

<table>
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<tr>
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<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf midrib →</td>
<td>White</td>
<td>Dull</td>
</tr>
</tbody>
</table>

| Numbers obtained | 501 | 184 | 189 | 17 |
| Calculated (30% cross over) | 465 | 203 | 203 | 20 |

$\chi^2 = 5.98; P > .05$.

The value $\chi^2 = 5.98$ with $P$ greater than .05 shows that the assumption of linkage with a 30% cross-over satisfactorily explains this deviation from the simple di-hybrid ratio.

Plants with brown leaf-sheaths and dull leaf midribs gave a juice extraction of 40%.

**Summary.**

In sorghum there is a linkage between the factor $P$ for purple leaf-sheath colour and $D$ for juiciness of stalk, with a recombination percentage of $30 \pm 1.8$.

**REFERENCES.**