ASSOCIATION OF YIELD COMPONENTS IN TOBACCO (*NICOTIANA TABACUM* L.)

Ghulam Ahmad Chaudhry* and Mushtaq Fareed**

ABSTRACT: Simple correlation coefficients were worked out among yield, height of the plant, days to flowering, number of curable leaves per plant and leaf index (leaf length x leaf breadth). Significant positive correlation coefficients were observed for association between yield and height of the plant and leaf index. In other cases, plant height was positively correlated with days to flowering, number of curable leaves per plant and leaf index and all other associations among these characters were non-significant. Correlation coefficients between yield and days to flowering and number of curable leaves were negative.

INTRODUCTION

Tobacco is an important cash crop in Pakistan. However, the yield is only 1411 kilograms per hectare which is very low as compared to other tobacco growing countries such as Japan, Canada and U.S.A. where per hectare yield is 2600, 2397 and 2213 kilograms, respectively. To improve yield and quality one has to resort firstly to hybridization and then to selection for the desirable segregates. Information about association of different plant characters provides the breeder a reliable basis to select an appropriate breeding procedure. Jinks (1954), working on tobacco, obtained high positive correlations between: plant height and number of capsules; number of days to flowering and plant height; leaf length and leaf breadth; and plant height and leaf length. Rajput and Munshi (1969) recorded high positive correlation between leaf length and leaf breadth, and between number of leaves and weight of the leaves per plant but negative correlation between days to flowering and yield. Rajput and Ali (1977) observed that leaf length and leaf breadth have almost complete positive correlation. According to him plant height is positively and yield negatively, correlated with days to flowering while yield and number of leaves have positive correlation with plant height.

The present investigations were made to find out the association between important morphological characters in eight *F*₁ crosses of *Nicotiana tabacum* L. at Agricultural Research Station, Bahawalpur.

MATERIALS AND METHODS

Experimental material consisted of eight *F*₁ crosses of outstanding varieties of *Nicotiana tabacum* which were being maintained pure for the last many years at Agricultural Research Station, Bahawalpur. Seedlings were raised in nursery beds and every possible care was exercised to avoid any mechanical mixtures of seeds from other varieties while sowing. Nursery transplanting was done on 10th February. For recording data on the characters, five plants from each cross were selected at random and labelled.

Correlation studies were made between the following characters:

- days to flowering and plant height
- days to flowering and yield of cured leaves per plant
- plant height at maturity and number of curable leaves per plant
- plant height at maturity and yield of cured leaves per plant
- leaf index (leaf length x leaf breadth) and yield of cured leaves per plant
- leaf index and plant height at maturity

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RESULTS AND DISCUSSION

The data regarding different morphological characters are presented in Table 1.

Simple correlation coefficients were computed using the following formula (Steel and Torrie, 1960).

\[
rx y = \frac{\text{sxy} - \frac{\text{sx} - \text{sy}}{N}}{\sqrt{\left(\frac{\text{sx}^2 - (\text{sx})^2}{N}\right) \left(\frac{\text{sy}^2 - (\text{sy})^2}{N}\right)}},
\]

where

\[r = \text{simple correlation coefficient}\]
\[N = \text{total number of observations}\]
\[s = \text{sum}\]
\[x = \text{first variable}\]
\[y = \text{second variable}.\]

Yield was significantly correlated with plant height and highly significant, positively correlated with leaf index. Correlation coefficients between yield and days to flowering and number of curable leaves have been calculated to be negative. As regards association among characters other than yield, plant height and days to flowering were found to be significantly correlated. Correlation between plant height with number of curable leaves and leaf index was found to be significantly positive. All other associations among these characters were non-significant. The results obtained in these studies agreed with those reported by Jinks (1954), Rajput and Munshi (1969) and Rajput and Ali (1977). Significant correlation of the characters with yield suggest that all of them are important components in determining the final yield per plant. The use of any one or all of these as criteria for selection should be expected to result in improvement of yield. Greater emphasis on plant height and leaf index which have yielded coefficient of relatively, higher magnitude for correlation with yield seems appropriate.

<table>
<thead>
<tr>
<th>Crosses ((F_1))</th>
<th>Plant height ((\text{cm}))</th>
<th>Days to flowering</th>
<th>No. of curable leaves/plant</th>
<th>Leaf index ((\text{cm}^2))</th>
<th>Yield of cured leaves/plant ((\text{g}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJx25H</td>
<td>56.54</td>
<td>74.65</td>
<td>9.8</td>
<td>399.92</td>
<td>174.99</td>
</tr>
<tr>
<td>25HxDJ</td>
<td>49.15</td>
<td>73.95</td>
<td>9.20</td>
<td>318.70</td>
<td>160.88</td>
</tr>
<tr>
<td>DJxT50</td>
<td>65.02</td>
<td>75.20</td>
<td>8.50</td>
<td>464.44</td>
<td>181.51</td>
</tr>
<tr>
<td>T50xDJ</td>
<td>67.31</td>
<td>73.00</td>
<td>7.95</td>
<td>462.85</td>
<td>185.12</td>
</tr>
<tr>
<td>DJx1100</td>
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<td>75.35</td>
<td>11.15</td>
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</tr>
<tr>
<td>1100xDJ</td>
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<td>78.25</td>
<td>10.65</td>
<td>476.75</td>
<td>190.93</td>
</tr>
<tr>
<td>25HxT50</td>
<td>51.81</td>
<td>70.00</td>
<td>9.10</td>
<td>341.32</td>
<td>175.34</td>
</tr>
<tr>
<td>T50x25H</td>
<td>51.55</td>
<td>68.75</td>
<td>8.00</td>
<td>425.61</td>
<td>178.17</td>
</tr>
</tbody>
</table>
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Table 2. Correlation coefficients of yield and other characters in tobacco

<table>
<thead>
<tr>
<th>Character</th>
<th>Plant height</th>
<th>Days to flowering</th>
<th>No. of curable leaves/plant</th>
<th>Leaf index per plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield of cured leaves/plant</td>
<td>0.83*</td>
<td>0.36 NS</td>
<td>0.211 NS</td>
<td>0.87**</td>
</tr>
<tr>
<td>Plant height</td>
<td>0.71*</td>
<td>0.72 *</td>
<td>0.39 NS</td>
<td></td>
</tr>
<tr>
<td>Days to flowering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of curable leaves/plant</td>
<td></td>
<td></td>
<td></td>
<td>−0.05 NS</td>
</tr>
</tbody>
</table>

NS = non-significant
* = significant at 5% level of significance
** = significant at 1% level of significance

LITERATURE CITED


