VARIATIONS IN THE HICKS VARIETY
OF BRIGHT TOBACCO

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For many years it was a common practice for growers of bright tobacco to produce their own tobacco seed. These growers recognizing the importance of good seed in the production of high yields of good quality tobacco usually selected "seed plants" with special care. Because of the large number of seed produced on a single plant one could require high and rigid standards in the selection of these plants.

Successful tobacco growers often made seed of their special selections available to other growers in their communities and several such selections became known by the family name of the originator. Several of the bright tobacco varieties that are widely grown in North Carolina today may have originated in such a manner; however, in many cases the exact origin of a given variety may have become obscure.

Since tobacco is rarely cross-pollinated, the varieties that have originated as farmer selections are undoubtedly highly homozygous. At the same time, such varieties could contain considerable heterogeneity which might not be eliminated by mass selection. Through mechanical mixture, natural and/or mass selection, it is possible that various strains of these varieties may have developed. Although such strains might differ considerably, they could still be known by the same name.

The objectives of the investigations here reported were: To determine the nature and extent of genetic differences existing among various collections of seed of the Hicks Variety. In the event genetic differences were observed, an attempt was to have been made to determine any heritable differences that might be present within collections. In so doing, it would be possible to isolate superior pure lines for use as breeder's seed for the production of foundation seed and, in turn, certified seed.
Experimental Work in 1950:

In 1950 seed of the Hicks variety were obtained from five different sources - four from commercial seedsmen and one from the experimental station. Two tests, one at McCullers, and one at Upper Coastal Plain Experiment Station were set out to determine the nature and extent of differences existing among these collections.

At each location, these collections were compared in experiments designed as randomized blocks with eight replications. Each plot consisted of two 3-1/2 feet rows, forty feet long with plants spaced 22 inches in the drill. Thus, there was a total of 40 competitive plants per plot.

The fertilization practices followed at each location were those recommended by the North Carolina Agricultural Experiment Station for those areas. Uniform topping and suckering practices were followed. Harvests were made in accordance with the degree of maturity of each collection and the harvests from individual plots were labeled in order that they could be identified throughout the curing and grading processes.

The data from these experiments were appropriately combined for statistical analyses. A summary is presented in Table 1. From these combined data the following observations were made:

a. No significant differences were observed in value per 100 pounds.

b. Collection D flowered later than and collection E flowered earlier than the remaining collections.

c. Collection B outyielded all other collections except C.

d. In value index collection B was superior to all collections except C.

Data on additional characters were also collected at the Upper Coastal Plain Station and are presented in Table 2. From these data the following observations were made:
a. No significant differences were obtained in length of the longest leaf, width of the largest leaf, percent sugar, percent nicotine or percent nitrogen.

b. Collection E produced more suckers than any other collection.

c. Collection B produced more leaves than each of the collections except C.

From these observations the following conclusions were drawn:

a. Genetic differences were exhibited among collections. Since these strains had perhaps been developed by mass selection, there is perhaps genetic variability within collections.

b. Although there may be genetic differences within collections, there were no consistent differences among collections in length and width of largest leaves, percent nicotine, percent nitrogen, percent sugar, or value per 100 pounds.

c. Collections differed in earliness, yield per acre, value index, sucker index, and leaf number.

d. In considering the factors of major economic importance (yield per acre and value index) it is concluded that collections B and C were superior to the other three. This superiority is perhaps due to the fact that on an average these collections produced more leaves, resulting in a higher yield and in turn a higher value index.

The Isolation of Pure Lines:

Since there was a possibility that the Hicks variety might at sometime in the future come up for consideration for certification, a program was also started in 1950 to establish the best pure-line of this variety as a possible source of breeder's seed. Individual plant selections were made in each of the five collections in 1950. Head-to-row plantings were made in 1951 and
individual plant selections were again made.

Experimental Work in 1953:

Five pure-lines were selected from the best-appearing plants and compared in replicated tests in 1953 at McCullers and Upper Coastal Plain Experiment Station. These were also compared with collection B, the best strain in the 1950 tests. The objective of these tests was to establish the best genetically pure-line for use as a possible source of breeder's seed. Concurrently, each of the five lines was increased under controlled conditions of pollination so that foundation seed would be available of the best line.

The data from these experiments were analyzed separately and also combined for analyses. The data from the combined analyses are shown in Table 3. From these data the following observations were made:

a. Lines 3 and 4 outyielded all others. The high number of leaves per plant probably accounted for the higher yields of 3 and 4.

b. There was no difference in the value per acre of lines 2, 3, and 4 but they surpassed lines 1, 5, and 6 (the check).

c. Line 2 had a higher value per 100 pounds than all others. This is an indication that the quality of this line was superior to all others.

d. Lines 3, 4, and 5 were not different in maturity but were later than the others. Line 2 was later than 1 but was not different from 6.

e. Line 3 had the lowest sucker index.

f. Line 3 and 4 produced the most leaves. There was no difference between 2 and 6 but both produced more leaves than 1.

g. The lines may be ranked for height in the order of 1, 6, 2, 4, 5, and 3 with 1 being the shortest.

h. No difference was observed among 1, 2, and 3 in internode length.
1. There were no differences in the length and width of the center leaves.

2. Lines 1, 2, and 6 all had wider leaves at the top than did lines 3, 4, and 5.

3. Line 1 produced the longest leaves at the top.

From these observations the following conclusions were drawn:

a. Genetic differences were exhibited among lines.

b. There was probably some heterogeneity within the various collections.

c. The pure-lines differed in all characters measured except the length and width of the center leaf.

d. Uniformity was obtained within lines and all plants within a line matured at about the same time. Selection pressure was against premature flowering and earliness, a common objection to the variety.

e. Lines 3, 4, and 5 were the tallest, latest, and had the most leaves but these leaves were small at the top of the plant and the quality, based on value per 100 pounds of cured leaf, was lower than 2.

f. The Hicks variety as it is presently grown is perhaps a composite of different lines. As a result it was possible to isolate both early and late types as well as both tall and short types from various collections of Hicks. Since Hicks has been noted as a variety that "buttons" early under adverse weather conditions, selection of a type that is inherently later and true to form is desirable.

Line 2 strongly resembled the check, 6, in appearance; however, it did not flower early as did some plants of the check variety. Line 2 was very uniform in maturity. Although it did not yield as much as did lines 3 and 4,
it had much better quality and consequently a value per acre comparable to
the higher yielding lines. This line appeared to be superior to the check
collection and had the desirable characteristics commonly accredited to the
Hicks variety.
Table 1

HICKS SOURCE OF SEED TESTS 1950

COMBINED ANALYSES OF T.V. 29 (McCullers) and T.V. 30 (Upper Coastal Plain Experiment Station)

<table>
<thead>
<tr>
<th>Collection</th>
<th>Yield per Acre (pounds)</th>
<th>Value Index*</th>
<th>Value Per 100 lbs.</th>
<th>Days to Flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1492</td>
<td>376</td>
<td>25.39</td>
<td>46.8</td>
</tr>
<tr>
<td>B</td>
<td>1577</td>
<td>399</td>
<td>25.92</td>
<td>47.3</td>
</tr>
<tr>
<td>C</td>
<td>1544</td>
<td>388</td>
<td>25.12</td>
<td>47.5</td>
</tr>
<tr>
<td>D</td>
<td>1476</td>
<td>364</td>
<td>24.79</td>
<td>49.4</td>
</tr>
<tr>
<td>E</td>
<td>1505</td>
<td>369</td>
<td>24.62</td>
<td>45.6</td>
</tr>
<tr>
<td>L.S.D. (5%)</td>
<td>72</td>
<td>22</td>
<td>N.S.</td>
<td>1.8</td>
</tr>
<tr>
<td>L.S.D. (1%)</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
<td>2.4</td>
</tr>
<tr>
<td>C.V. (%)</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

* Value per acre as calculated from average price paid in North Carolina for the various Government Grades from 1939 through 1941.
Table 2
HICKS SOURCE OF SEED TEST - 1950
T.V. 30 UPPER COASTAL PLAIN EXPERIMENT STATION
Rocky Mount, N. C.

<table>
<thead>
<tr>
<th>Collection</th>
<th>Sucker Index</th>
<th>Leaf Number</th>
<th>Length Largest Leaf (inches)</th>
<th>Width Largest Leaf (inches)</th>
<th>% Sugar</th>
<th>% Nicotine</th>
<th>% Nitrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>31.8</td>
<td>18.9</td>
<td>23.37</td>
<td>12.86</td>
<td>24.74</td>
<td>2.07</td>
<td>1.93</td>
</tr>
<tr>
<td>B</td>
<td>31.6</td>
<td>19.6</td>
<td>23.64</td>
<td>12.73</td>
<td>25.62</td>
<td>1.58</td>
<td>1.92</td>
</tr>
<tr>
<td>C</td>
<td>32.1</td>
<td>19.5</td>
<td>23.45</td>
<td>12.28</td>
<td>26.33</td>
<td>2.12</td>
<td>1.91</td>
</tr>
<tr>
<td>D</td>
<td>30.8</td>
<td>18.9</td>
<td>23.30</td>
<td>13.02</td>
<td>25.59</td>
<td>2.02</td>
<td>1.95</td>
</tr>
<tr>
<td>E</td>
<td>35.4</td>
<td>18.6</td>
<td>23.45</td>
<td>12.55</td>
<td>26.42</td>
<td>1.93</td>
<td>1.87</td>
</tr>
</tbody>
</table>

L.S.D. (5%) 2.2 0.6 N.S. N.S. N.S. N.S. N.S. N.S.
L.S.D. (1%) 3.0 0.8 N.S. N.S. N.S. N.S. N.S. N.S.
C.V. (%) 7 3 3 5 5 4 4

...
<table>
<thead>
<tr>
<th>Line</th>
<th>Yield per acre (pounds)</th>
<th>Value**</th>
<th>Value per 100 lbs.</th>
<th>Days to flower Index</th>
<th>Sucker Leaf Index</th>
<th>Leaf Number</th>
<th>Stalk Height (inches)</th>
<th>Internode Length (inches)</th>
<th>Width Center Leaf (inches)</th>
<th>Length 5th leaf from top (inches)</th>
<th>Width 5th leaf (inches)</th>
<th>Length 5th leaf from top (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1700</td>
<td>910</td>
<td>53.52</td>
<td>54.2</td>
<td>14.1</td>
<td>20.0</td>
<td>48.36</td>
<td>2.44</td>
<td>10.06</td>
<td>21.98</td>
<td>5.86</td>
<td>16.90</td>
</tr>
<tr>
<td>2</td>
<td>1848</td>
<td>1019</td>
<td>55.14</td>
<td>56.7</td>
<td>12.7</td>
<td>21.0</td>
<td>51.65</td>
<td>2.48</td>
<td>9.86</td>
<td>21.95</td>
<td>5.71</td>
<td>15.74</td>
</tr>
<tr>
<td>3</td>
<td>1955</td>
<td>1032</td>
<td>51.70</td>
<td>59.9</td>
<td>9.0</td>
<td>24.0</td>
<td>57.53</td>
<td>2.44</td>
<td>9.44</td>
<td>21.84</td>
<td>4.56</td>
<td>15.18</td>
</tr>
<tr>
<td>4</td>
<td>1982</td>
<td>1054</td>
<td>53.14</td>
<td>58.9</td>
<td>10.6</td>
<td>23.5</td>
<td>54.91</td>
<td>2.35</td>
<td>9.54</td>
<td>21.54</td>
<td>4.58</td>
<td>15.02</td>
</tr>
<tr>
<td>5</td>
<td>1801</td>
<td>938</td>
<td>52.01</td>
<td>59.1</td>
<td>11.1</td>
<td>23.2</td>
<td>53.31</td>
<td>2.30</td>
<td>9.50</td>
<td>21.52</td>
<td>4.97</td>
<td>15.98</td>
</tr>
<tr>
<td>6</td>
<td>1758</td>
<td>948</td>
<td>53.84</td>
<td>56.9</td>
<td>14.5</td>
<td>21.5</td>
<td>50.82</td>
<td>2.38</td>
<td>9.94</td>
<td>21.28</td>
<td>5.82</td>
<td>16.11</td>
</tr>
</tbody>
</table>

LSD (5%) 107 60.9 1.07 1.1 1.4 .7 2.20 .10 N.S. N.S. .39 .81
(1%) 143 81.4 1.43 1.5 1.8 .9 2.95 N.S. N.S. .53 1.08
C.V. (%) 6 7 2 2 12 3 5 5 7 4 8 6

** Value per acre as calculated from average price paid in North Carolina for the various government grades in 1952.