Two Preliminary Reliable Indicators of Earliness in Cotton-II

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Abstract: Two preliminary earliness indicators (main stem node number of first sympodial branch and days taken to open first flower) were evaluated. Seven advance strains and four commercial varieties to check their reliability and also to screen out most early varieties for further exploitation in breeding programs as well as at the farmers fields. CRIS-110 produced significantly lowest main stem node number of first sympodial branch (5.9) and was recorded as early variety followed by CRIS-85 and CRIS-107 (6.6) and CRIS-117 (7.1). CRIS-9 was observed as late variation in the test which produced significantly highest main stem node number of first sympodial branch (9.12). As regards the second parameter (days taken to open first flower, CRIS-79, CRIS-85, CIM-443 and CIM-448 opened their first flower (44- DAP) earlier than the other and were observed as early maturing varieties. CRIS-9 opened its first flower after 48 days of planting and was observed late with the similar trend shown while producing first sympodial node number. The two indicators studied are reliable and efficient while predicting the earliness of any variety.

Key words: Earliness, first sympodial node number, data of flower, sympodial branch, cotton

Introduction
Earliness of the crop maturity is important in the avoidance of frost damage, insect and disease build up, soil moisture depletion and weathering of the open cotton. Earliness also has other advantages, such as allowing rotation with a winter crop or extending the season for harvesting and ginning operations. Therefore, great emphasis on earliness has been advocated by cotton breeders in order to increase production efficiencies by decreasing input of fertilizer, water, crop protection and in part, by pest management consideration. Earliness in cotton cannot be measured easily because of the fact that the cotton plant flowers and sets bolls over a long period of time. Earliness is influenced by how early the cotton plant begins to flower, rate at which the flowers open and the length of time required for the boll to mature.

Rehana et al. (2001) while carrying out earliness studies on five genotypes by evaluating five characters viz., plant height, main stem node number bearing 1st sympodial branch, number of days to attain 5-NAWF (Nodes Above White Flower) stage for their effectiveness in measuring earliness, opined that characters attaining date of 5-NAWF stage and date of opening first flower/boll were more reliable indicators of earliness. Rehana (1999) conducted earliness studies on five upland cotton varieties and found that varieties with lower node number of first sympodial branch were screened out as early varieties. She further suggested that because CRIS-9 took highest number of days to open its first flower (48.5 DAP) was rated as late variety whereas CRIS-19 which took 45.5 days to open its first flower was observed as early variety in the test. Aden (1997) while working on some upland cotton cultivars reported that the varieties bearing first sympodial branch considerably at lower main stem node number were rated as early maturing.

Lehghi (1997) compared to the earliness of the varieties and found that CRIS-8 was one of the early maturing cultivar mainly because of its character of developing its first sympodium at relatively lower position on the main stem. Godoy (1994) worked on seven early lines and one full-season cultivar to gain information on 15 earliness estimators. The results indicated that number of nodes of the first fruiting branch, plant height, first square date, date of first flower and date of first open boll can be used for efficient selection of early genotypes. Although total number of flowers, flower index and maturity index appeared unsuitable as selection criteria, they could be used as indicators of differences between genotypes that are evaluated for yield. Kerby et al. (1990) conducted field trials during 1988-89 in 18 cotton cultivars known for substantial variation in phenological and yield parameters. The cultivars were classified as early, intermediate or late maturing. They concluded that days to first flower from sowing provided a reliable estimation of earliness of maturity and the mean maturity date gave the best yield estimate. Munro (1997) reported that the number of main stem nodes produced before the first fruiting branch is important characteristic affecting the earliness of the crop. Ray and Richmond (1966) suggested that the node number of the first fruiting branch is a morphological measure of earliness of good heritability and is highly correlated with earliness as estimated through picking data of seed cotton. Richmond and Radivan et al. (1962) made a comparative study of seven method of measuring earliness. There of the measurements were based on the number of days from planting to the date of a specific phenological event (i.e., date of first square, first bloom and first open boll). The other four measurements were based on the ratio of various fractions of the crop yield to the total crop yield. They concluded that out of seven methods used, the most practical was the combined weights of the first and second pickings expressed as a percentage of the total seed cotton harvest.

The objective of this study was to see the efficiency and reliability of two preliminary indicators of earliness (days taken to open first flower and node number of first sympodial branch) in seven advance strains developed by CCRI Sakrand and four commercial varieties.

Materials and Methods
A field experiment was conducted at the experimental area CCRI Sakrand during 2001 cotton season. The trial consisted of seven advance strains of CCRI Sakrand (CRIS-79, CRIS-82, CRIS-83, CRIS-85, CRIS-107, CRIS-110 and CRIS-117) and four commercial varieties (CIM-443, CIM-448, N/A/78 and CRIS-9). The experiments was conducted in Randomized Complete Block Design. The row to row distance was maintained at 2.5 feet whereas plants within rows were thinned out to maintain a distance of 8-9 feet in between. Each treatment plot contained seven rows 47.5 feet long. All the agronomical, nutritional and plant protection requirements of the experiment were completed as and when needed. A random number of ten plants from the fourth row of each cultivar per replication were monitored individually for two earliness indicators (days taken to open first flower and node number of first sympodial branch). The data were statistically analyzed for analysis of variance (ANOVA) adopting Steel and Torrie (1980) procedure.

Results and Discussion
Mean squares obtained from analysis of variance (Table 1) showed highly significant differences among the cultivars for both the characters studied (days taken to open first flower and node number of first sympodial branch). The range recorded for the trait days taken to open first flower (Table 2) was from 44 DAP (CRIS-79, CRIS-85, CIM-443 and CIM-448) to 48 DAP (CRIS-83 and CRIS-8), whereas for second character main stem node number of first sympodial branch was from 6.9 (CRIS-110) to 9.12 (CRIS-9).

Numbers of days taken to open first flower: There existed highly significant differences among the cultivars for the character number of days taken to open first flower (Table 1). The results demonstrated that two advance strains CRIS-79 and CRIS-85 and two commercial checks CIM-443 and CIM-448 opened their first flower (44 DAP) significantly earlier than other varieties/strains under study thus as suggested by Solis et al. (1969) that the character days taken to open first flower provide reliable estimation of earliness, these four strains/varieties were recorded as early maturing when compared with other varieties. Accordingly CRIS-82, CRIS-83, CRIS-107, CRIS-110, CRIS-117 and CRIS-9 were observed comparatively late as these strains/varieties opened their first flower in the range of 46-48 days after sowing (Table 2). Rehana et al. (2001), Rehana (1999), Aden (1997) and Godoy (1994) have also confirmed that the character days taken to first

121
Table 1: Mean squares obtained from the ANOVA of two preliminary indicators of earliness in eleven upland cotton cultivars

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Replications</th>
<th>Cultivars</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees of freedom</td>
<td>3</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Main stem node number of first sympodial branch</td>
<td>0.197</td>
<td>2.96***</td>
<td>0.16</td>
</tr>
<tr>
<td>Days taken to open first flower</td>
<td>0.188</td>
<td>2.685***</td>
<td>0.095***</td>
</tr>
</tbody>
</table>

***Highly significant

Table 2: Mean values of two preliminary indicators of earliness in eleven upland cotton cultivars

<table>
<thead>
<tr>
<th>CRIS-79</th>
<th>CRIS-82</th>
<th>CRIS-83</th>
<th>CRIS-85</th>
<th>CRIS-107</th>
<th>CRIS-110</th>
<th>CRIS-117</th>
<th>CIM-443</th>
<th>CIM-448</th>
<th>NIAB-78</th>
<th>CRIS-9</th>
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<tbody>
<tr>
<td>44</td>
<td>46</td>
<td>48</td>
<td>44</td>
<td>46</td>
<td>46</td>
<td>46</td>
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<td>44</td>
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<td>48</td>
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<td>Days taken to open first flower</td>
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<tr>
<td>Main stem node number of first sympodial branch</td>
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<td>7.6</td>
<td>7.5</td>
<td>7.7</td>
<td>6.8</td>
<td>6.8</td>
<td>5.9</td>
<td>7.1</td>
<td>7.52</td>
<td>7.25</td>
<td>8.50</td>
<td>9.12</td>
</tr>
</tbody>
</table>

flower is a reliable indicator. According to their results the variety which takes minimum days to open its first flower will record itself as early maturing.

Node number of first sympodial branch: Highly significant differences among the cultivars for the character node number of first sympodial branch were observed (Table 1). CRIS-110 by producing main stem node number of first sympodial branch significantly at lower position (5.9) was observed early maturing variety followed by CRIS-85 and CRIS-107 which had their main stem node number at 6.8 (Table 2). CRIS-9 by producing its first sympodial node number significantly at highest position (9.12) was observed as late variety in the test. All advance strains developed by CCRI Sakrand included in the test significantly produced lower node number of first sympodial branch than two commercial checks NIAB-78 and CRIS-9 were observed earlier than the two checks. The workers like Rehana et al. (2001), Aden (1997), Rehana (1999), Leghari (1997) and Godoy (1994) have also suggested that the varieties with first sympodial node number at higher position are late maturing and vice versa. It is strange to note the un-understandable behavior of CRIS-110 which produced node number of first sympodial branch at lowest position (5.9) and recorded itself as earliest variety in the test but opened its first flower after 48 days of planting and stood in the range of some what late maturing varieties. This variety would had opened its first flower after 43-44 days of planting, this might be due to some experimental error or data recording error.

It was therefore, concluded that decisions regarding selection for earliness can be made early in the season keeping in view the date of opening first flower and node number of first sympodial branch. Variation in maturity of cultivars can be distinguished early in the flowering stage using the above two parameters as suggested by Rehana et al. (2001), Aden (1997), Rehana (1999) and Godoy (1984). Further crop management decisions regarding insect pest control, irrigation and fertilizer applications can be taken keeping in view the above two preliminary characters as reliable indicators of earliness.

References


