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Predicting Earliness in Cotton During Crop Development Stage-11

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Abstract: Two preliminary earliness indicators (days taken to open first flower and main stem node number of first sympodial branch) were evaluated in an experiment, 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. The results demonstrated that DNH-49 significantly opened its first flower (44 DAP) earlier than other strains hence was observed as early maturing variety followed by CRIS-82 (45 DAP). CIM-482 opened its first flower after 48 days of planting and was observed as late, followed by FH-900 (47 DAP). As regards the second character (node number of first sympodial branch), the same trend of earliness was observed as in days taken to open first flower. Accordingly, DNH-49 produced significantly lowest main stem node number of first sympodial branch (7.1) and was recorded as early followed by CRIS-82 (7.2) and NIAB-999 (7.3). CIM-482 and FH-900 were observed as late strains in the test which produced significantly highest main stem node number of first sympodial branch (8.6) followed by BH-121 (8.5). The results demonstrated that the two indicators studied are reliable and efficient while predicting the earliness of any variety during the crop development stage.

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

Introduction

Earliness of the crop maturity is important in the avoidance of frost damage, insect and disease buildup, 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, greater 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. Anjum *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 bloom first flower / boll and 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.

Anjum (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 day 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. He further opined that because CRIS-134 opened its first flower comparatively earlier (44 DAP) therefore was recorded as early maturing variety as compared to other varieties included in the test. Leghari (1997) compared the earliness of the varieties and found that CRIS-9 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 to 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) have reported the association of earliness with lower main stem node number of first sympodial branch. Solis *et al*. (1989) 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 (1987) 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 seedcotton. Richmond and Radwan (1962) made a comparative study of seven methods of measuring earliness. Three 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 ratios 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 seedcotton 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) and also to predict the earliness of cotton varieties during crop development stage in nine candidate strains developed by different breeders of Pakistan.

Materials and Methods

A field experiment was conducted at the experimental area of CCRI Sakrand during 2000 cotton season. The trial included nine candidate strains (DNH-49, CIM-482, BH-125, NIAB-999, MNH-536, CRIS-82, FH-900, AEC/78/3/89 and BH-121) developed by different breeders of Pakistan tested in National Coordinated Varietal Trial. The experiment was conducted in randomized complete block design with four replications. 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" 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.

Table 1: Mean squares obtained from ANOVA of two preliminary indicators of earliness in nine cotton cultivars

Sources cultivars	Replications	Cultivars	Error
Degree of freedom	3	8	24
Main stem node number of first sympodial branch	0.226	3.33***	0.372
Days taken to open first flower	0.199	2.511***	0.228

***Highly significant

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

Variety/strain	Days taken to open first flower	Node number of first sympodial branch	Variety/ strain	Days taken to open first flower	Node number of first sympodial branch
DNH-49	44	7.1	CRIS-82	45	7.2
CIM-482	48	8.6	FH-900	47	8.6
BH-125	46	7.5	AEC/78/3/89	46	8.1
NAIB-999	45	7.3	BH-121	46	8.5
MNH-536	46	7.9			

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 (DNH-49) to 48 DAP (CIM-482), whereas for second trait main stem node number of first sympodial branch was from 7.1 (DNH-49) to 8.6 (CIM-482 and FH-900). Similar trend in varietal behavior was recorded for both the characters under study.

Number 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 candidate strain (DNH-49) opened its first flower (44 DAP) significantly earlier than other strains under study thus as suggested by Solis *et al.* (1989) that the character days taken to open first flower provide reliable estimation of earliness, DNH-49 was recorded as early maturing in the test when compared with other strains followed by NIAB-999 and CRIS-82 (45 DAP). Accordingly, CIM-482 was observed comparatively late in the test as this strain opened its first flower 48 days after planting (Table 2). Anjum *et al.* (2001), Anjum (1999), Aden (1997) and Godoy (1994) have also confirmed that the character days taken to open first flower is reliable indicator of earliness. 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). DNH-49 by producing main stem node number of first sympodial branch significantly at lower position (7.1) was observed as early followed by CRIS-82, NIAB-999 and BH-125 which had their main stem node number at 7.2, 7.3 and 7.5 respectively showing the same varietal trend/behavior as observed in days taken to open first flower (Table 2). CIM-482 and FH-900 by producing their first sympodial node number significantly at highest position (8.6) were observed as late strains in the test followed by BH-121 (8.5) and AEC/78/3/89 (8.1). The workers like Anjum *et al.* (2001), Aden (1997), Anjum (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 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 Anjum *et al.* (2001), Aden (1997), Anjum (1999) and Godoy (1994). 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

Aden, S. A., 1997. Impact of nodal development, fruiting pattern and boll retention ability on earliness and yield in upland cotton. M. Sc. Thesis, Sindh Agric. Univ, Tandojam.

Godoy, S., 1994. Comparative study of earliness estimators in cotton *(Gossypium hirsutum L.)* Red de Fibras-Algodon, CIFAP-Laguna-INIFAP, Apdo, Postal 247, Torreon, Mexico. ITEA- Production-Vegetal, 90:175-186

Kerby, T. A., K. G. Cassman and M. Keeley, 1990. Genotypes and plant densities for narrow row cotton systems, 1. Height, nodes, earliness, and location of yield. Crop. Sci., 30: 644-649.

Leghari, A. M., 1997. Variation in fruit retention ability and its relationship to seedcotton yield in four upland cotton cultivars. M. Sc. Thesis, Sindh Agric. Univ. Tandojam.

Munro, J. M., 1987. Cotton (Tropical Agriculture series). Long man Group UK Limited, 1987.

Ray, L. L. and T. R. Richmond, 1966. Morphological measures of earliness of cotton. Crop Sci., 6: 527-631.

Anjum, R., 1999. Yield and earliness studies on American Upland cotton cultivars. M. Sc. Thesis, Sindh Agric. Univ. Tandojam.

Anjum, R., A. R. Soomro and M. A. Chang, 2001. Measurement of earliness in upland cotton. Pak. J. Biol. Sci., 4: 462-463.

Richmond, T. R. and Sami, R. H. Radwan, 1962. A comparative study of seven methods of measuring earliness of crop maturity in cotton. Crop Sci., 2: 394-400.

Solis, R. O., R. P. Cabangbang and R. F. Bader, 1989. Phenological and product quantity measures of earliness in cotton *(Gossypium hirsutum)*. Philippine, 72: 279-289.

Steel, R. G. D. and J. H. Torrie, 1980. Principles and procedures of statistics, a biological approach. Second Edition, McGraw Hill Inc., New York, Toronto, London.