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STUDY OF EARLINESS IN COMMERCIAL COTTON (*G. hirsutum* L) GENOTYPES

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Abstract: The research work was conducted at Central Cotton Research Institute (CCRI), Multan during the normal crop growing season 2002-03, including fourteen varieties, (thirteen from Punjab and one from Sindh province) with the aim to find out the earliness in the said varieties. From the experimental results it is concluded that CIM-443 produced significantly lowest main stem node number of first sympodial branch (4.6) followed by CIM-240 and Karishma (5.7). While the highest main stem node bearing first sympodial branch number was recorded in variety CIM-1100. The less number of days to first flower was taken by variety CIM-443 followed by CIM-240, while the more number of days were recorded in variety CIM-1100. Therefore, it is concluded that CIM-443 is the earliest maturing variety among all the fourteen varieties.

Keywords: Cotton, earliness, genotypes, node number of first sympodial branch.

INTRODUCTION

Early maturity in cotton has many advantages. It enables the cotton crop to develop during periods of more favorable moisture, escapes losses from late season insect injuries (Attack of pink bollworms, American bollworms and whitefly) extending the season for harvesting and ginning operation. The earliness helps to fit the cotton crop in cotton-wheat rotation. This character cannot be easily measured since the cotton plant flowers and sets bolls over a long period of time. However, some other scientists studied the different components of plant that growth contributing towards early maturity as Babar *et al.* [2002] reported that there are two main factors for indicating the earliness in a crop i.e. main stem node number of first sympodial branch and days taken to first flower appearance. Rehana *et al.* [2001] while studying earliness in five upland cotton genotypes found that main stem node number bearing first sympodial branch, and number of days to attain 5-NAWF (Nodes Above white Flower) are the key factors for attaining earliness in cotton genotypes. In 1999 Rehana also reported that the appearance of first lower node number of first sympodial branch is the main factor responsible for earliness in upland cotton. Aden [1997] searched out that bearing first sympodial branch is an important for measuring the earliness in upland cotton cultivars. Leghari [1997] studying earliness in cotton cultivars found that CRIS-9 was one of the early maturing cultivars mainly because of its characters of developing its sympodial branches at lower position on the main stem. Godoy [1994] studied seven early and one full season cultivars to obtain information on 15 earliness estimators. He

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found that number of node of the first fruiting branch, plant height, first square date, date of first flower and date of first open boll can be used for accurate/efficient selection of earliness in cotton. Kerby *et al.* [1990] reported that the lesser the days to flowers from sowing date, the earlier would be the variety. Munro [1987] reported that the number of main stem nodes produced before the first fruiting branch is affecting the earliness of crop. Leffler [1979] stated that commonly used definition of earliness is the proportion of the total crop yield that is produced by the time of first picking. Joham [1979] pointed that the time of First Square, open flower, or the nodal position of the first fruiting branch are measures of earliness. Verhalen *et al.* [1975] concluded that the production of earlier cotton might result from increasing the number of early bloom or from broadening the peak for the number of boll set. Muramoto *et al.* [1971] searched out that cold tolerance is desirable in certain varieties because of losses due to unpredictable cold period following planting. Seedling exposed to cold often produced earlier plant because flowering is induced at lower nodes. Such plants have shorter internodes. If these characters are to be induced by planting early to produce earlier maturing crops, more cold tolerance is necessary. Low *et al.* [1969] reported that lowering of the node number of the first fruiting branch on the main shoot induce the earliness in cotton varieties. Hearn [1969] gave the faster squaring or flowering rules for earliness. Ray and Richmond [1966] estimated through picking data of seed cotton that the node number of first fruiting branch is a morphological measure of earliness and a good indicative of heritability for this character. Richmond and Radwan [1962] gave a list of several parameters including date of first flower appearance for earliness in cotton crop. The earlier the date of first flower occurrence the earlier will be the variety. Brown [1951] has listed three factors for earliness, i. e., time taken from sowing to appearance of first flower, time taken from sowing to peak of flowering and time taken from sowing to appearance of first boll. The shorter the above three periods the earlier will be the variety.

MATERIALS AND METHODS

The present studies were conducted at Central Cotton Research Institute (CCRI), Multan in a Commercial Varietal Trial comprising 13 varieties of Punjab viz. NIAB-78, CIM-109, CIM-240, CIM-1100, CIM-448, KARISHMA, CIM-443, CIM-446, CIM-482, BH-118, FH-900, FH-901 and CIM-473 and one variety of Sindh, i.e., Marvi. Sowing was done on May 18th, 2002 with three replications in a randomized complete block design with a plot size of 50'x10', row to row distance of 30" and plant to plant distance of 12". All agronomic and management practices were kept same. Keeping in view the importance of the earliness the data for the date of first flower appearance and the number of main stem nodes produced before the first flowering branch were recorded.

The number of main stem nodes produced before first fruiting branch is an important characteristic, affecting the earliness of the crop and the location of the bolls of the plant. Five consecutive plants from each variety in each repeat were taken for recording of the data. Starting with the node above the cotyledinous leaves as node one the number of main stem node produced before fruiting branch was counted. Date of first flower appearance is an indication of the earliness of the crop, and makes the start of the flowering period with all that it implies for the grower. Data were recorded for first flowering of five plants from each repeat. The numbers of the days taken from date of sowing to the appearance of the first flower were calculated. The data thus obtained were subjected to the analysis of variance using MSTATC, a computer software package [Bricker 1991].

RESULTS AND DISCUSSIONS

NODE OF FIRST FRUITING BRANCH (NFB)

The average number of nodes for first fruiting branch is given in Table 1. Analysis of variance was also carried out to find out the critical differences among the varieties, which showed that the varieties differed significantly at 5% level of significance. It is assumed that the rate of node production on the main stem within any variety is fairly uniform, so the lower the first fruiting branch (NFB) the sooner the first flower appears. Low NFB is thus the parameter for production of earlier crop. The data presented in Table 1 revealed that CIM-443 was the earliest genotype with 4.6 NFB followed by CIM-240 and Karishma with 5.7 NFB whereas the highest NFB 8.1 and 8.0 were recorded for the late maturing genotypes CIM-1100 and BH-118 respectively. The present research findings are in agreement with previous studies of Babar *et al.* [2002], Rehana *et al.* [2001], Rehana [1999], Aden [1997], Leghari [1997], Godoy [1994], Kerby *et al.* [1990], Munro [1987], Joham [1979], Muramoto *et al.* [1971], Low *et al.* [1969], Ray and Richmond [1966] and Brown [1951].

Table 1: Node of first fruiting branches (NFB) and number of days from sowing to the appearance of first flower.

Varieties	Node of first fruiting branch	No. of days from sowing to first flower
NIAB-78	6.4	56
CIM-109	6.0	59
CIM-240	5.7	52
CIM-1100	8.1	70
CIM-448	6.2	59
Karishma	5.7	56
CIM-443	4.6	51
CIM-446	7.0	61
CIM-482	6.1	53
BH-118	8.0	64
FH-900	7.9	59
FH-901	6.2	58
CIM-473	5.9	53
Marvi	6.6	62
LSD@ 5%	0.85	5.34

NUMBER OF DAYS FOR APPEARANCE OF FIRST FLOWER

The average number of days for appearance of first flower is given in Table 1. The data of first flower is an indication of earliness. It is the resultant product of a number of factors, besides the sowing date, such as temperature, water supply and the node of first fruiting branch. The last of these depends in turn on the species, variety and night temperatures.

The CIM-443 is found to be the earliest maturing variety, which took 51 days for the appearance of first flower closely followed by CIM-240 (52 days) CIM-482 and CIM-473 (53 days). Whereas CIM-1100 and BH-118 were late maturing varieties and required 70 and 64 days respectively for the appearance of the first flower. The experimental results are in agreement with the research work of Babar *et al.* [2002], Rehana [1999], Godoy [1994], Kerby *et al.* [1990], Hearn [1969], Richmond and Radwan [1962], Brown [1951].

References

Aden, S.A., (**1997**) "Impact of nodal development, fruiting pattern and boll retention ability on earliness and yield in cotton", M. Sc. Thesis, Sindh Agriculture University, Tandojam, Sindh, Pakistan.

Babar, S.B., Soomro, A.R., Anjum, R., Memon, A.M. and Soomro, A.W. (**2002**) "Two preliminary reliable indicators of earliness in cotton-II", *Asian J. of Plant Sci*., 1(2), 121-122.

Bricker, B. (**1991**) MSTATC: A microcomputer program for design management and analysis of agronomic research experiments, Crop and Science Department, MSU East Lancing, MI 48824 USA.

Brown, C.H. (**1951**) "Earliness in cotton", *Emp. Cotton Rev.* 28, 253-255.

Godoy, S. (**1994**) "Comparative study of earliness in cotton (*G. hirsutum* L)" Red de Fibras-Algodon, CIFA-Laguna-INFAP, Apdo, Postal 247, Torreon, Mexico, *IEA-Production-Vegetal* 90(3), 175-186.

Hearn, A.B. (**1969**) "Growth and performance of cotton in a desert environment". *J. Agric. Sci.* (Camb) 73, 65-97.

Joham, H.E. (**1979**) "The effect of nutrient on fruiting efficiency", *Proceedings of Beltwide Cotton Production Research Conference, Phoenix, Arizona*, 306-311.

Kerby, T.A., Cassman, K.G. and Keeley, M. (**1990**) "Genotype and plant densities for narrow row cotton system, I height nodes, earliness and location of yield", *Crop Sci.,* 30, 644-649.

Leffler, H.R. (**1979**) "Physiology of earliness", *Proceedings of Beltwide Cotton Production Research Conference, Phoenix, Arizona,* 264-265.

Leghari, A.M. (**1997**) "Variation in fruit retention ability and its relationship to seed cotton yield in four upland cotton cultivars", M.Sc. Thesis, Sindh Agriculture University, Tandojam, Sindh, Pakistan.

Low, A., Hesketh, J.D. and Muramoto, H. (**1969**) “Some environmental effects on the varietal node number of first fruiting branch”, *Cotton Grow. Rev*. 46, 181-188.

Munro, J.M. (**1987**) “Cotton (Tropical Agriculture Series)”, Longman Group Limited, UK.

Muramoto, H., Hesketh, D.J.D. and Baker, D.N. (**1971**) “Cold tolerance in a hexaploid Cotton”, *Crop Sci*. 11, 589-591.

Ray, L.L., and Richmond, T.R. (**1966**) “More phonological measures of earliness of crop maturity in cotton”, *Crop Sci*. 6, 527-531.

Rehana, A. (**1999**) “Yield and earliness studies on American Upland cotton cultivars”, M.Sc. Thesis, Sind Agriculture University, Tandojam, Sind, Pakistan.

Rehana, A., Soomro, A.R. and Chang, M.A. (**2001**) “Measurement of earliness in upland cotton”, *Pak. J. Biol. Sci*., 4, 462-463.

Richmond, J.R. and Radwan, S.R.H. (**1962**) “A comparative study of seven methods of measuring earliness in cotton”, *Crop Sci*. 2, 397-400.

Verhalen, L.N., Mamaghani, R., Horrison, W.C. and Nc New, R.W. (**1975**) “Effect of blooming date on boll retention and fibre properties in cotton”, *Crop Sci*. 15, 47-52.