ISSN 1023-1072

Pak. J. Agri., Agril. Engg., Vet. Sci., 2010, 26 (1): 39-44

EXPLORING MOST EFFICIENT AND RELIABLE PARAMETERS TO MEASURE EARLINESS IN COTTON (*GOSSYPIUM HIRSUTUM*) GENOTYPES

R. Panhwar, A. R. Soomro, B. A. Ansari, S. A. Panhwarand S. Memon

Department of Plant Breeding and Genetics, Sindh Agriculture University, Tandojam, Pakistan.

ABSTRACT

Earliness is one of the universal objectives in a cotton management scheme. Earliness can be defined as the shortest amount of time to produce profitable cotton. Keeping in mind the above definition, a field experiment was conducted in the year 2009 to compare the reliability and efficiency between two earliness parameters (days taken to appearance of first flower and first sympodial node number) at the early growth stage of 26 cotton genotypes. Results revealed that for both the parameters there was highly significant difference among all the 26 genotypes. Numerically, CRIS-342 and Shahbaz were rated as early maturing genotypes which took 41.7 days to appearance of first flower followed by CRIS-121 and H-151 which took 42.7 days to appearance of first flower. As regards to second earliness parameter (first sympodial node number), it was observed that CRIS-121 was the earliest genotype which gave 4.2 first sympodial node number followed by Shahbaz (4.4) and CRIS-342 (4.5). These three genotypes were also rated earlier ones through the first earliness parameter i.e., days taken to appearance of first flower. Thus, it was concluded that both earliness parameters designated CRIS-342, Shahbaz and CRIS-121 as early maturing genotypes, therefore, both the parameters could reliably and efficiently be considered for measuring earliness in cotton.

Keyword: Days to 1st flowering, early stage, first sympodial node number, maturity.

INTRODUCTION

In Pakistan, cotton accounts for 60% of total foreign exchange earnings through the export of raw cotton and cotton products. It also provides raw material to local domestic cotton industry. Cotton has 85% share in the country's total vegetable oil production. Cottonseed cake, an important by-product, is a valuable source of protein for ruminant cattle. About 40%labor force of the country is employed in cotton fields and cotton

Corresponding author: razaquesoomro@hotmail.com

processing mills. It accounts for 8.2% of the value added in agriculture and about 2% to GDP. Pakistan ranks fourth in the area and production of cotton in the world. Pakistan has 9.36% of total world cotton area, 10.18% of production, 8.06% of consumption and 4.55% of total world export of raw cotton. Globally, Pakistan is one of the largest cotton producing and consuming countries in the world.

Earliness is a term peculiar to the cotton industry, and embodies the desire to harvest the crop as soon as possible without incurring a significant yield penalty. Delayed crops increase chemical costs and risk exposure to greater degrees of climatic risk, which may affect parameters such as fiber quality. In growing cotton crop, the early maturity is possible which increases the possibility of early harvest that is completed before cold and rainy weather.

There are certain morphological plant features that provide an estimate of earliness in cotton. For instance, node of first fruiting branch, number of vegetative branches and %age of bolls on vegetative branches were reported by previous workers (Ray and Richmond, 1966). Richmond and Radwan (1962) reported that combined weight of first and second picking, expressed as %age of total seed cotton yield harvested, was one of the most practical methods.

Characters like attaining date of 5-NAWF stage and date of opening first flower boll are more reliable indicators for earliness (Rehana *et al.,* 2001) in cotton. Another study (Rehana *et al.,* 2002) suggested that genotypes with lower sympodial node number mature earlier. The cotton genotypes having rapid boll opening with higher opening %age at particular dates and lower sympodial node number could be used as reliable indicators of earliness (Soomro *et al*., 2002). Association of sympodial node number with earliness in cotton genotypes has also been reported by Ali *et al*. (2003). Similarly, other workers like Babar *et al*. (2003); Soomro *et al*. (2004) and Umar *et al*. (2005) conducted studies on various parameters of earliness including first sympodial node number and days taken to appearance of first flower and reported that through above two parameters earliness in cotton genotypes could be predicted reliably.

Present study was based to make comparison between two earliness parameters i.e., days taken to appearance of first flower and first sympodial node number and to explore the efficiency, accuracy and reliability between them in measuring earliness in twenty six cotton genotypes.

MATERIALS AND MEHTODS

This field experiment was conducted during 2009 on the experimental area of the Department of Plant Breeding and Genetics, Sindh

Agriculture University, Tandojam. Twenty six cotton genotypes were sown in a Randomized Complete Block Design that was replicated thrice. Three rows each of 5 m length with 1 meter distance between them were sown; plant to plant distance was maintained at 0.33 m in each row. All the agronomical as well as plant protection requirements of the crop were fulfilled. Ten plants were selected randomly from each genotype per replication to record observations on two earliness parameters i.e., days taken to appearance of first flower and first sympodial node number. The data were then averaged over replication and analysis of variance was worked out following the method of Gomez and Gomez (1984) to observe the variation among the genotypes for both the parameters. Duncan's multiple range test (DMRT) was applied following the method of Duncan (1955).

RESULTS AND DISCUSSION

Advantage of growing early maturing cotton cultivars is the provision of proper time for rotation of other crops allowing timely sowing of wheat in cotton-wheat-cotton cropping system. Thus, an experiment was conducted to evaluate 26 cotton genotypes for their early maturity through two parameters (days taken to open first flower and first sympodial node number). These parameters were also compared with each other for their reliability and efficiency in measuring the earliness. Mean squares for parameter days taken to appearance of first flower are presented in Table 1, whereas, for parameter first sympodial node number the results are given in Table 2. Statistically, all the genotypes showed highly significant differences among them for both the parameters of earliness indicating great genetic variation among the genotypes for the parameters under study.

Table1. Analysis of variance in respect of earliness parameter "days taken to open first flower".

Source	Degree of freedom	Mean squares	F- value
Replications	2	0.359	0.71
Genotypes	25	25.075	49.59*
Error	50	0.506	--

*Significant at 5% probability level CV= 1.56%

Table 2.Analysis of variance in respect of earliness parameter "first sympodial node number".

Source	Degree of freedom	Mean squares	F- value
Replications	2	0.011	0.51
Genotypes	25	1.938	92.12*
Error	50	0.021	--

* Significant at 1% probability level CV= 2.58%

Mean performance of the genotypes regarding two earliness parameters is depicted in Table 3. Accordingly, CRIS-342 and Shahbaz were found as the earliest genotypes due to the fact that they took minimum days (41.7) to open their first flower, followed by CRIS-121 and H-151 which took 42.7 days in opening their first flower. CIM-534 and BH-160 took maximum days (50.3) in opening their 1stflower thus were rated as the late maturing genotypes. The other late maturing genotypes were Hari Dost, NIAB-111, CIM-446, CIM-506 and FH-901 which took 50, 50, 49, and 50 and 49.6 days, respectively, in opening first flower, however, statistically these genotypes were at par with each other. The remaining genotypes were found medium to late maturing because they took several days to open first flower.

Table3. Mean performance of twenty six genotypes regarding two earliness parameters, during 2009.

Genotypes	Days taken to appearance of first flower	First sympodial node number
CRIS-121	42.7 de	4.2k
CRIS-342	41.7 e	4.5ij
Reshmi	44.7 c	6.3 d
Qalandri	44.0cd	5.9 e
Sindh-1	44.7 c	5.1 h
CRIS-467	46.0 b	6.8c
Hari Dost	50.0 a	7.3a
CIM-534	50.3 a	5.6f
NIAB-111	50.0 a	7.0 b
MNH-786	45.0 bc	5.4fgh
CIM-482	43.7 cd	5.4fgh
CRIS-9	43.7 cd	7.0 bc
CIM-707	44.7 c	5.3 fgh
BH-160	50.3 a	5.3gh
Gomal-93	44.7 c	6.0e
CRIS-134	46.0 b	5.4 fgh
CIM-446	49.3 a	6.0e
CIM-506	50.0 a	6.4 d
FH-901	49.7 a	5.4 fgh
CIM-496	43.7 cd	4.7 i
CIM-499	44.0 cd	5.3gh
CIM-473	44.3 c	5.5 fg
NIBGE-2	43.7cd	5.2 h
Marvi	44.3 c	5.2 h
Shahbaz	41.7 e	4.4jk
H-151	42.7 de	5.6 f

Means followed by similar letters in a column do not differ significantly according to DMR test

As regards to second parameter (first sympodial node number), the data presented in Table 3 indicated that CRIS-121 remained the earliest genotype which gave 4.2 first sympodial node number followed by the genotypes Shahbaz (4.4) and CRIS-342 (4.5). However, late maturing genotypes evaluated through this parameter were Hari Dost, NIAB-111 and CRIS-9, which produced first sympodial node number of 7.3, 7.0 and 7.0, respectively. Other genotypes were rated as medium to late maturing. When reliability and efficiency of the two parameters is compared, it was observed from the data that both the parameters simultaneously evaluated CRIS-342, CRIS-121 and Shahbaz as early maturing, while, Hari Dost, NIAB-111, CRIS-9 and CIM-534 as late maturing genotypes, whereas, remaining genotypes were medium to late in maturity. The results suggest that both the parameters are equally reliable and efficient in measuring earliness in cotton. Present results are in line with the results of Rehana *et al.* (2001) who suggested that main stem node number bearing 1st sympodial branch, number of days to bloom 1st flower are reliable indicators of earliness. In another study, Rehana *et al.* (2002) compared earliness of advance strains and concluded that cotton genotypes with lower sympodial node number mature earlier, whereas present results also suggest that sympodial node number is good and efficient parameter for measuring earliness in cotton.

The results of present study are also in line with those reported by Ali *et al.* (2003) who also found CIM-443 to be earliest variety as it had lowest first sympodial node number at 4.6 followed by CIM-240 and Karishma (5.7), whereas, the highest main stem node bearing first sympodial branch number was recorded in variety CIM-1100 rendering it as a late variety. Babar *et al.* (2003) studied first sympodial node number, date of appearance of first flower, weekly blooming, first boll open, boll retention% and seedcotton yield plant^{-1} while comparing earliness in cotton varieties and reported that sympodial node number parameter evaluated CRIS-134 as earlier variety as it had its first sympodial branch developed significantly at the lowest position (5.7) than other cultivars in comparison. In present study, it was observed that CRIS-121 and Shahbaz were earliest in maturity as these genotypes had developed first sympodial node number significantly at lowest position.

CONCLUSION

It is concluded from the study that both the parameters i.e. days taken to appearance of first flower and first sympodial node number, could reliability be considered to measure earliness in cotton.

REFERENCES

Ali, R., M. Arshad, M. I. Khan and M. Afzal. 2003. Study of earliness in commercial cotton (*G. hirsutum* L.) genotypes. J. Res. (Sci.) BZU, Multan, 14 (2):153-157.

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

Anjum, R., A. R. Soomro, S. B. Babar, A. W. Soomro and A. M. Memon. 2002. Predicting earliness by different indicators in cotton-III. Indus J. Pl. Sci., 1 (1):9-14.

Babar, S. B., M. A. Chang, A. S. Adan, R. Anjum and A. R. Soomro. 2003. Effect of various parameters on earliness and seedcotton yield. Indus J. Pl. Sci., 2(2):198-201.

Duncan, D. B. 1955. Multiple range and multiple F tests. Biometrics, 11:1-42.

Gomez, K. A. and A. A. Gomez. 1984. Statistical Procedures for Agriculture Research (2nd ed.) John Wiley and Sons. New York.

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

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

Soomro, A. R., R. Anjum, S. B. Babar, A. M. Memon and A. W. Soomro. 2002. Predicting earliness by different indicators in cotton-I. Indus J. Pl. Sci., 1(1):36-41.

Soomro, A. R., Z. Mahmood, N. Illahi and Allahyar. 2004. Earliness comparison in new cotton strains of CCRI, Multan. Indus J. Pl. Sci., 3(1):1-4.

Umar, A., A. R. Soomro, R. Anjum, S. R. Soomro, M. A. Chang and N. Soomro. 2005. Study of some phenotypic traits related with earliness in upland cotton. The Indus Cotton, 2(1):79-84.

(Received 29 July, 2009;Revised 22 June, 2010)