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ORIGINAL ARTICLE

Studies on Reproductive Morphological variations in genetic Male sterile line (A), its Fertile counterpart (B), male parent (R) and F1 (A X R) of *G. arboreum* L., cv.Y-1

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ABSTRACT

Genus *Gossypium* L. has caught the interest all over the world for various reasons. It is the most leading fiber, food-producing crop in the world and consists of 50 species, out of which 44 are diploids and remaining are allo-tetraploids. Looking to the importance of genetic male sterility in *Gossypium arboreum* L. for large scale production of F1 hybrid seed at cheaper rate in large quantities, experiment was carried out with an objective of assessing the diversity in the stable genetic male sterile line of *Gossypium arboreum* L. cv.Y-1 at morphological level. Observations of morphological characters were recorded in ten random samples for measurements in these haploids and their diploid counter parts. Mean and coefficient variation were calculated as per Snydecor and Caochran (1967). The individual plants of cultivar were carefully observed for reproductive morphological characters like Teeth/bracteole (No.), Peduncle length (cm), Calyx length and breadth (cm), Petal length (cm), Anthers/flower (No.), Bolls/plant (No.), Boll diameter (cm), Boll weight (g), Lint weight/boll (g) and seed weight/boll (g), Seeds/boll (No.) and Seed weight (g). The data on reproductive morphological characters indicated that there was marked variation in all reproductive morphological characters studied.

Key Words: *Gossypium, Male Sterile, Morphology*

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INTRODUCTION

Genus *Gossypium* L. has caught the interest all over the world for various reasons. It is the most leading fiber, food-producing crop in the world and consists of 50 species, out of which 44 are diploids and remaining are allo-tetraploids. In India four cotton species are generally grown, of which *G. herbaceum* and *G. arboreum* are diploid (2n=26); *G. hirsutum* and *G. barbadense* are tetraploid (2n=52). In addition, hybrids generated from crossing tetraploid species (*G. hirsutum*) are also cultivated in central and southern cotton growing zones. The cotton producing areas in India can be classified into three Zones namely North Zone, popularly called as "Cotton basket of India" (Hirsutum and Arboreum Zones). Looking to the importance of genetic male sterility in *Gossypium arboreum* L. for large scale production of F1 hybrid seed at cheaper rate in large quantities, experiment was carried out with an objective of assessing the diversity in the stable genetic male sterile line of *Gossypium arboreum* L. cv.Y-1 at morphological level.

MATERIALS AND METHODS:

GMS and male lines of *G. arboreum*, were obtained from the Cotton Breeder, Mahatma Phule Krishi Vidyapeeth, Rahuri. The field experiment was raised and material for hybridization purpose were sown with their respective control. Then seeds were harvested and F1 male and female Genetic Male Sterile lines were again sown to obtain the hybrids.

Observations of reproductive morphological characters were recorded in ten random samples for measurements in these haploids and their diploid counter parts. Mean and coefficient variation were calculated as per Snydecor and Caochran [3]. The individual plants of cultivar were carefully observed for reproductive morphological characters like Teeth/bracteole (No.), Peduncle length (cm), Calyx length and breadth (cm), Petal length (cm), Anthers/flower (No.), Bolls/plant (No.), Boll diameter (cm), Boll weight (g), Lint weight/boll (g) and seed weight/boll (g), Seeds/boll (No.) and Seed weight (g)

RESULT AND DISCUSSION:

Studies on reproductive morphological characters of genetic male sterile line (A), its fertile counterpart (B), male parent (R) and F 1 (A × R) of *G. arboreum* L. cotton were carried out and results were depicted as below

Number of Bracteole teeth: The maximum average number of bracteole teeth 4.0 ± 0.78 was observed in flowers of male parent (R), while all flowers of remaining plants exhibited more or less identical bracteole teeth number i.e. 3.0.

Bracteole length: The highest length of bracteoles 3.01 ± 0.90 cm was observed in flowers of F1 (A × R), as compared to its parent and maintainer (B).

Bracteole breadth: Bracteole breadth (1.96 ± 0.72 cm) was observed maximum in male parent (R) as compared to others.

Peduncle length: The optimum length of peduncle 1.82 + 0.72 cm was recorded in the flowers of F 1 (A × R), followed by 1.71 + 0.83 cm and 1.62 ± 0.71 cm in male parent (R) and maintainer (B), respectively. While, minimum peduncle length 1.5 ± 0.65 cm was noticed in male sterile (A).

Calyx length: Highest calyx length 3.48 ± 1.32 cm was recorded in flowers of maintainer (B), second best 3.15 ± 1.20 cm in male parent (R), followed by 2.32 ± 1.1 cm male sterile (A). While lowest calyx length 2.04 ± 1.12 cm was noticed in flowers of F1 (A × R).

Calyx breadth: Similarly utmost calyx breadth 1.03 ± 0.38 cm was recorded in flowers of maintainer (B), second best 1.12 ± 0.63 cm in male parent (R), followed by 1.01 ± 0.33 cm in F1 (A × R). While lowest calyx breadth 0.98 ± 0.33 cm was noticed in flowers of male sterile (A).

Petal length: Length of petals 3.92 ± 0.73 cm was significantly observed more in flowers of F1 (A × R) as compared to its parent and maintainer (B).

Petal breadth: The maximum petal breadth 3.92 ± 0.65 cm was observed in the flowers of male sterile (A), followed by 3.65 ± 0.78 cm in maintainer (B), 3.35 ± 0.68 cm in F1 (A × R) and 2.96 ± 0.33 cm in male parent (R).

Petal spot length: Length of petal spot 1.24 ± 0.12 cm was considerably more in flowers of male parent (R), followed by 1.08 ± 0.23 cm in maintainer (B), 1.03 ± 0.43 cm in F1 (A × R) and 1.02 ± 0.42 cm in male sterile (A).

Petal spot breadth: Considerable reduction in petal spot breadth 0.89 ± 0.23 cm was observed in F1 (A × R) in contrast to its parents and maintainer (B).

Number of anthers per flower: An increased anther number per flower 82.4 ± 7.22 was observed in F1 as compared to 64.0 ± 4.90 in male parent (R) and 72.40 ± 5.59 in maintainer (B).

Number of Bolls per plant: The average number of bolls per plant was ranged from 47.0 ± 3.52 in F1 (A × R) plants, 42.0 ± 5.84 in male parent (R) and 35.0 ± 3.70 in maintainer (B).

Boll diameter: The individuals of F1 (A × R) produced largest bolls with diameter 2.87 ± 0.80 cm, followed by 2.75 ± 0.17 cm in maintainer (B) and 2.52 ± 0.86 cm in male parent (R).

Boll weight: Maximum boll weight 1.92 ± 0.13 g was recorded in F1 (A × R) followed by 1.83 ± 0.04 g in maintainer (B) and 1.73 ± 0.09 g in male parent (R).

Lint weight: The plants of F1 (A × R) as well as male parent (R) produced maximum lint weighing 0.76 ± 0.05 g than that of 0.68 ± 0.02 g by maintainer (B).

Number of seeds per boll: The utmost number of seeds per boll 25.0 ± 3.87 was found in maintainer (B) as compared to F1 (A × R) 24.0 ± 2.82 and 22.0 ± 3.56 male parent (R).

Seed Weight: The highest seed weight 1.18 ± 0.04 g was recorded in F1 (A × R), followed by 1.15 ± 0.03 g in maintainer (B) and 1.10 ± 0.80 g in male parent (R).

Yield per plant: The F1 (A × R) showed highest yield (58.4 ± 7.12 g) as compared to male parent (R) and maintainer (B).

The observations on different reproductive morphological characters were recorded on 10 plants in each replication of parents and hybrid. The results of these observations indicated increase in some characters in F1 as compared to its parents. Some of the flower characters showed variations. Pollen colour, weight of flower, length of peduncle, number of extra floral nectarines length and breadth at bract, breadth at bract, breadth of petal, number of anthers, length of stigma, number of seeds per locule differ significantly in *G. hirsutum* variety [1]. This might be due to the sampling error. Reproductive morphological characteristics have traditionally been used as the basis of variety description and for examination of variety distinctness. Patil and Suryawanshi [2] have classified the cotton genotypes on the basis of different seed, seedling and plant characteristics.

The data on reproductive morphological characters indicated that there was marked variation in all reproductive morphological characters studied. There was an increase bracteole teeth, bracteole length, bracteole breadth, peduncle length, petal length, anthers/ flower, number of bolls, boll diameter, boll weight, lint weight, seed weight and yield per plant of F 1 hybrid (A x R) as compared to genetic male sterile (A) and its fertile counterpart (B). While reduction in calyx length, calyx breadth, petal breadth, petal spot length and petal spot breadth was observed as compared to fertile counterpart (B) followed by genetic male sterile (A).

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