

Original Research Article

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## Dus Characterization of Cotton (*Gossypium hirsutum* L.)

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### ABSTRACT

#### Keywords

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Cotton is king of fibre crops and has economic importance worldwide and new cultivars have to be released continuously to meet the demanding needs of economic market. To meet our requirement broad genetic base is needed which is limited due to continuous usage of common parents for crossing. So the germplasm, advanced breeding lines are to be characterised for variable characters. DUS characters listed by PPV FRA, New Delhi were used for this purpose. The field studies were carried out during *kharif* 2017-18 at RARS, Lam. In descriptors leaf colour, hairiness, leaf appearance, leaf nectarines, leaf shape, stem hairiness, bract type, flower petal spot, flower anther colour filamentation, boll bearing habit, boll colour and boll opening variation is absent. Eight descriptors *i.e.* leaf petiole pigmentation, stem petiole pigmentation, flower petal colour, stigma position, pollen colour, boll shape, boll surface and boll tip had shown variation.

### Introduction

Cotton (*Gossypium* spp.) is an immensely important commercial crop of India grown for its fibre, feed, oil and fuel wood. In India, cotton is cultivated in an area of 122.0 lakh ha with a production and productivity of 377.0 lakh bales (1 bale = 170 kg) and 524 kg/ha, respectively. In Andhra Pradesh cotton occupies an area of about 5.44 lakh ha with a production of 22.0 lakh bales and an average

productivity of 688 kg/ha (AICCIP Annual Report, 2017-18). Large amount of uncharacterized germplasm and also advanced line are present which contain clear cut diagnostic features which are to be explored.

Keeping in view the importance of the present investigation was carried out to study the varietal characterization of forty genotypes and advanced breeding lines were collected

from different parts of country.

Descriptors of varieties of crop species are required for characterization of varietal identity, determine varietal purity and establish the distinctiveness of new variety from existing varieties and documentation of genetic resources. It means that the new variety has to be Distinct-Uniform-Stable (DUS) in its characteristics. Distinct means, a variety should be clearly distinguishable by one or more essential characteristics from any other existing variety. The variety is deemed uniform, if it is sufficiently uniform in its relevant characteristics, subject to variation that may be expected from the particular features of its population. The variety is said to be stable, if its relevant characteristics remain unchanged after repeated propagation. National DUS test guidelines for qualitative morphological characters listed by PPV FRA, New Delhi for cotton crop were used for characterization of the genotypes.

### **Materials and Methods**

The field experiment was carried out during *kharif* 2017-18 at Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh. The experimental design used was Randomized Block Design with three replications. One row of each genotype was sown with row length of 6.0 m, row to row distance of 105 cm, plant to plant distance of 60 cm. All the recommended package of practices were followed to raise a good crop. Five plants were randomly selected and tagged in each replication and their leaf, flower and boll characters were assessed based on visual observation.

Fourth leaf from the top of the plant was used for recording leaf characters such as leaf colour, leaf hairiness, leaf appearance, gossypol glands, leaf nectaries, leaf petiole pigmentation, leaf shape at peak flowering stage. Based on visual assessment leaf colour

was classified as light green, green, light red and dark red while leaf hairiness was observed as sparse, medium and dense. The appearance was categorized as cup or flat shaped leaves and presence or absence of gossypol glands, leaf nectaries and leaf petiole pigmentation were also observed. The shape of leaves was grouped as palmate, semidigitate, digitate and lanceolate.

Hairiness on stem was classified as smooth, sparse, medium and dense and the presence or absence of pigmentation on the stem was recorded at peak flowering stage. The bracts were observed as normal or frego. The flower characters such as petal colour, petal spot, stigma position, anther colour filamentation, pollen colour were also recorded. Petal colour was grouped as cream, yellow, deep yellow and purple. The presence or absence of petal spot and anther colour filamentation was observed. Stigma position is categorized as embedded or exerted. Pollen colour is classified as white, cream, yellow, deep yellow and purple.

The boll characters boll bearing habit, boll colour, boll shape, boll surface and prominence of boll tip were recorded. The boll bearing habit was observed as solitary or clustered. The trait boll shape was recorded before boll bursting and grouped into round, ovate and elliptic categories. Boll surface was classified into smooth and pitted surface and the tip of boll was observed and classified as blunt and pointed.

### **Results and Discussion**

The results obtained DUS Characterization of 40 genotypes of cotton is presented in table 1. Variation was absent for the characters leaf colour, hairiness, leaf appearance, leaf nectaries, leaf shape, stem hairiness, bract type, flower petal spot, flower anther colour filamentation, boll bearing habit, boll colour and boll opening. All the genotypes had green

colour leaves with medium hairiness and all the leaves were flat shaped.

**Table.1** Variable Dus Characters In 40 Genotypes Of Cotton (*Gossypium Hirsutum* L.)

S.No.	Genotypes	Leaf petiole pigmentation	Plant stem pigmentation	Flower petal colour	Flower stigma	Pollen colour	Boll shape	Boll surface	Boll tip
1	CNH 1118	Present	Present	Yellow	Embedded	Yellow	Ovate	Smooth	Pointed
2	RS 2767	Present	Present	Cream	Embedded	Cream	Ovate	Smooth	Pointed
3	L 1060	Present	Absent	Cream	Embedded	Cream	Ovate	Smooth	Pointed
4	SCS 1061	Present	Present	Cream	Embedded	Cream	Ovate	Pitted	Pointed
5	SCS 1214	Present	Present	Cream	Embedded	Yellow	Ovate	Smooth	Pointed
6	LH 2220	Present	Present	Cream	Embedded	Cream	Ovate	Smooth	Pointed
7	GJHV 510	Present	Absent	Cream	Embedded	Cream	Ovate	Smooth	Pointed
8	RAH 1066	Present	Absent	Cream	Embedded	Cream	Round	Smooth	Blunt
9	TSH 0533-1	Present	Absent	Cream	Exerted	Yellow	Round	Smooth	Blunt
10	H 1471	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
11	HS 292	Present	Present	Cream	Embedded	Cream	Ovate	Smooth	Blunt
12	CCH 14-1	Present	Present	Cream	Embedded	Cream	Elliptical	Smooth	Blunt
13	ARBH 1401	Present	Present	Cream	Exerted	Cream	Round	Smooth	Blunt
14	CPD 402	Present	Absent	Cream	Exerted	Cream	Round	Smooth	Blunt
15	CNH 5	Present	Present	Cream	Embedded	Yellow	Ovate	Smooth	Blunt
16	CCH 14-2	Absent	Absent	Cream	Exerted	Cream	Ovate	Smooth	Blunt
17	GJHV 497	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
18	HS 294	Absent	Absent	Cream	Exerted	Cream	Round	Smooth	Blunt
19	LH 2256	Present	Present	Cream	Exerted	Cream	Round	Smooth	Blunt
20	PBH 10	Absent	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
21	L799	Absent	Absent	Cream	Exerted	Yellow	Ovate	Smooth	Blunt
22	RAH 1033	Present	Absent	Cream	Exerted	Cream	Round	Smooth	Blunt
23	H 1442	Present	Present	Cream	Exerted	Cream	Round	Smooth	Pointed
24	BS 26	Absent	Absent	Cream	Exerted	Cream	Elliptical	Smooth	Blunt
25	LRK 516	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
26	TSH 2838	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
27	SURAJ	Present	Absent	Cream	Exerted	Yellow	Elliptical	Smooth	Blunt
28	TSH 0499	Absent	Absent	Cream	Exerted	Cream	Elliptical	Smooth	Blunt
29	RS 2765	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
30	L 1008	Present	Present	Yellow	Exerted	Cream	Round	Smooth	Blunt
31	F 2501	Present	Absent	Cream	Exerted	Cream	Round	Smooth	Blunt
32	TCH 1741	Absent	Absent	Cream	Exerted	Cream	Round	Smooth	Blunt
33	ARBH 1402	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
34	BS 23	Present	Absent	Cream	Exerted	Yellow	Round	Smooth	Blunt
35	F 2493	Present	Present	Cream	Exerted	Cream	Round	Smooth	Blunt
36	SCS 1207	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
37	L 788	Absent	Present	Cream	Exerted	Yellow	Ovate	Smooth	Blunt
38	GISV 267	Present	Present	Cream	Exerted	Cream	Ovate	Smooth	Blunt
39	SAKTHI SULTAN	Present	Present	Cream	Exerted	Cream	Round	Smooth	Blunt
40	L 389	Present	Present	Cream	Embedded	Cream	Ovate	Smooth	Blunt

All the genotypes contain gossypol glands and leaf nectaries. Presence of leaf gossypol glands is good for the plant as it had antibiosis effect on insects like *Spodoptera exigua* (army worm), *Helicoverpa zea* (Bollworm), black flea hopper or at least inhibits the

growth of these insects (Bottger *et al.*, 1964). Nectariless cotton helps in controlling the pink bollworm damage and also reduction in attack of tarnished plant bugs but no line has shown this character. Similar observation was made earlier by Carty *et al.*, (1983). Leaf petiole pigmentation was present in most of the genotypes while pigmentation was absent in seven genotypes indicating the usefulness of this character as a tool for identification of specific genotypes. Leaf shape was palmate in all the lines which is conducive for the egg laying by bollworms.

Stem pigmentation was absent in 15 genotypes while remaining genotypes showed pigmentation. Similar grouping was reported by Padmavathi *et al.*, (2009), Aruna *et al.*, (2012) and Tulasi *et al.*, (2012) in cotton. Stem hairiness was medium in all the genotypes. The bracts were normal in all the genotypes. The cream colour is a common petal characteristic of upland cotton and petal colour was cream in 38 lines and yellow in 2 lines (CNH 1118 and L 1008). Stigma position was exerted in 28 lines and embedded in 12 lines. These results were in conformity with the observations made by Patil and Suryawanshi (1996), Reddy *et al.*, (2007), Padmavathi *et al.*, (2009) and Tulasi *et al.*, (2012) in cotton.

Petal spot and anther colour filamentation were absent. Pollen colour was cream in 32 lines and yellow in eight lines.

Boll bearing habit and boll colour in all the lines were solitary and green, respectively and most of the cases these are normal characteristics. Boll shape was round in 14 lines, ovate in 22 lines and elliptic in 4 lines. Boll surface was smooth in all the lines except in one line (SCS 1061). Boll tip was blunt in 32 lines and eight lines had pointed one. Boll opening was semi-open in all the lines.

Thus, the characterization of germplasm using DUS descriptors is helpful for varietal identification and protection and these forty lines are reservoirs for different parameters which can be exploited in breeding programmes.

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