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A Preliminary Study on the Occurrence of Double Bolls in Cotton and its Relationship on Growth and Earliness *

by

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Synopsis: A comparative study undertaken between a double bolled *G. hirsutum* plant and the normal plants of M. C. U. 3 revealed that the rate of growth was not influenced by the presence of double bolls. The double bolled plant was compact with more number of fruiting points, with shorter flowering period and high productivity which are desirable economic attributes for evolving a high yielding cotton strain.

Introduction: The yield of a cotton plant is a complex character governed by many factors. Number of bolls per plant, number of locks per boll, number of seeds per lock, size of the boll and retentivity are some of the important characters that are commonly correlated with plant yield. The increase in number of bolls per plant in turn depends on the number of fruiting points with high retentivity. The flowers in cotton are usually extra-axillary, terminal and solitary, but the rare occurrence of two flowers on a fruiting point developing into normal bolls have also been recorded. The breeding behaviour of this character was studied by various workers and was recorded to be genic in nature. The bearing and growth behaviour will be useful for isolating a high yielding type and with this end in view, the present study has been undertaken.

Review of Literature: Thadani (1923) has reported the occurrence of cluster habit in *Gossypium hirsutum* types as a result of excessive shortening of sympodial internodes. Kearney (1930) has described forms with one to three flower buds borne on a single node in *G. barbadense*. According to him, short branching behaved as incompletely dominant over normal. Hubbard (1930) has recorded forms with flowers within cotton bolls. Afzal and Singh (1939) have described a petaloid mutant as double flower. Harland (1939) has observed the cluster habit to segregate in all grades of blending between clustered and normal. He suggested the gene sympol C^{LH} for clustered habit and C^{LB} for short branching. Patel *et al* (1947) have reported a mutant of *G. herbaceum* which combined both short branch and clustered habit. Clustering of monopodial and sympodial branches particularly at terminal portions has been described by Chavada and Patel (1954). Bhat and Desai (1956) have studied a hybrid between a whorled mutant and a short branched mutant and concluded that these two characters are governed by complementary genes. Recently, Butany and Munshi Singh (1963) spotting a different form of cluster habit with uninodal sympodium, have observed it as simple recessive to normal and provisionally designated the character by the gene symbol cl_s.

Materials and Methods: A double boll plant was noted during 1962—'63 in culture 2226-3, which is a reselection from SB 91-E *(G. hirsutum)* obtained from Un-irrigated Cambodia Scheme, Periakulam. The seeds of this plant formed the source of material for study. During 1963—'64, a total number of 24 plants was

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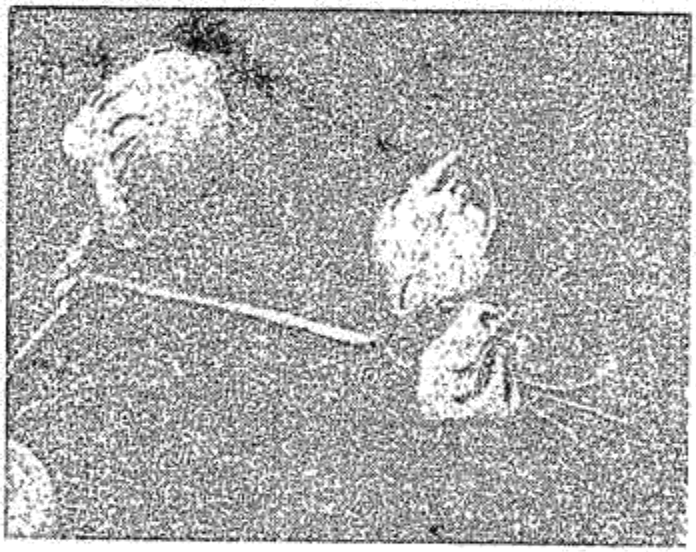
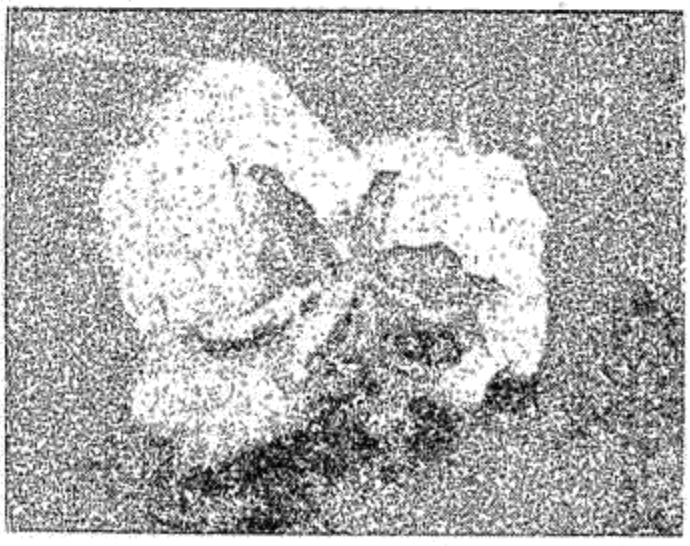
* Received on 22—12—1965.

raised and compared with normal plants of M. C. U. 3 *(G. hirsutum)* raised on either side. Growth rates of plants were recorded from fifth week to thirteenth week *i. e.* from the commencement of bud initiation till the cessation of growth. The sympodial branching habit, internodal lengths in sympodia, flower period (time taken from squaring to opening of flowers) and total number of fruiting points and mean number of bolls per plant were also gathered. Based on the weekly plant height, the rate of growth index was worked out as described by Ramiah and Kaiwar (1942) to find out whether there was any abnormal growth phase at any time. Observations on the occurrence of double flowers and bolls were also recorded.

Results and Discussions: All plants showed characters like leafy structures instead of flowers, variations in bracteoles from two to six, fused flower buds and occurrence of more than one flower on a single node. Many of the double flowers on single nodes were retained till maturity (Plate). The occurrence of more than one bud on the same node is similar to that reported by Kearney (1930) in *G. barbadense.*



Two bolls on a single node



Fused boll

The mean height of plants and the rate index of growth for the double bolled plants and M. C. U. 3 are presented in Table I.

TABLE I

Sl. No.	Weeks after sowing	Mean of 22 plants			
		M. C. U. 3		Double boll plant	
		Plant ht. (in cm)	Rate index	Plant ht. (in cm)	Rate index
I.	5th Week	12·9	...	14·6	...
2.	6th ,,	17·1	0·29	18·9	0·31
3.	7th ,,	24·6	0·49	28·1	0·49
4.	8th ,,	31·8	0·32	35·1	0·26
5.	9th ,,	38·9	0·16	42·3	0·19
6.	10th ,,	41·7	0.08	45·6	0·08
7.	11th ,,	44·7	0·07	48·2	0.06
8.	12th ,,	46·0	0·03	50·4	0·04
9.	13th ,,	46·1	...	50·6	...
	'F' test C. D. (P=0·05)		0·08		0·11
	S. E.		0·03		0·04

It is seen that there was no appreciable difference in growth rate between the two plants. It appears, therefore, that the occurrence of double bolls has no bearing on the growth rate.

The data on internodal length, mean flowering period, mean number of fruiting points and mean number of bolls per plant are furnished in Table II.

TABLE II

Sl. No.	Culture	Mean internodal length of sympodial branch (cm)	Mean flower period in days	Mean No. of fruiting points	Mean No. of bolls per plant retained	Setting %
1.	M. C. U. 3	7·6 3·9	30·8	56·5	12·2	21·6
2.	Double boll	5·5 1·8	26·9	87·1	16·7	19·1
	't' value: Calculated	2·41*	12·50£	15·69£	7·25£	
	Observed	2·05	2·90	2·95	2·95	

* Significant at 5% level.

£ Significant at 1% level.

The double boll type is thus, a more compact one with shorter internodes (5·5 cm), with reduced flowering period (26·9 days) and more number of flowers (87·1). The higher number of fruiting points with shorter flowering periods indicated quicker formation of successive fruiting points in double-boll producing

plants compared to normal plants. Thadani (1923) has also reported that the clustering was due to excessive shortening of sympodial internodes in mutant which he studied. The present plant, however, varied from that reported by Chavda and Patel (1954) in which clustering of monopodial and sympodial branches particularly at terminal portions occurred. The setting of bolls is lower with 19·1 per cent in double-boll type as against 21·6 per cent in M. C. U. 3; but the number of bolls retained per plant is more, 16·7, as against 12·2 in M. C. U. 3. This is due mainly to large number of fruiting points produced in plants with double bolls and indicated the potentiality for higher production of bolls in the plants.

Summary and Conclusion: A double boll plant was spotted out in a culture 2226-3 of *G. hirsutum* and was studied in comparision with normal plants of M. C. U. 3. The study showed that the rate of growth was not influenced by the double boll character. The double boll type was compact with reduced internodal length of sympodia and had more number of fruiting points. Its flowering period was shorter and the mean number of bolls per plant was higher than normal. The compact body build with large number of fruiting points with shorter flowering period indicating earliness and high productivity in the double bolled plant are desirable economic traits for evolving a high yielding cotton strain.

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