GAMMA-RAY INDUCED FLORAL MUTANT AFFECTING FEMALE FERTILITY IN *CAPSICUM* L.

THE genus *Capsicum* L. presents a wide spectrum of genetic variability with several gene mutations affecting different parts of the plant. Mutations influencing the morphological features of the flower were earlier described in *Capsicum* by Murthy[2], Bansal[1] and Murthy and Lakshmi[3]. However, the present mutant, screened in M_1 generation of gamma-ray irradiated plants of CA 960 variety, is a new and novel type hitherto unreported as far as is known to the authors. Hence, a detailed study of its morphology, cytology and genetics was planned and the present paper embodies the results and their cytogenetic implications.

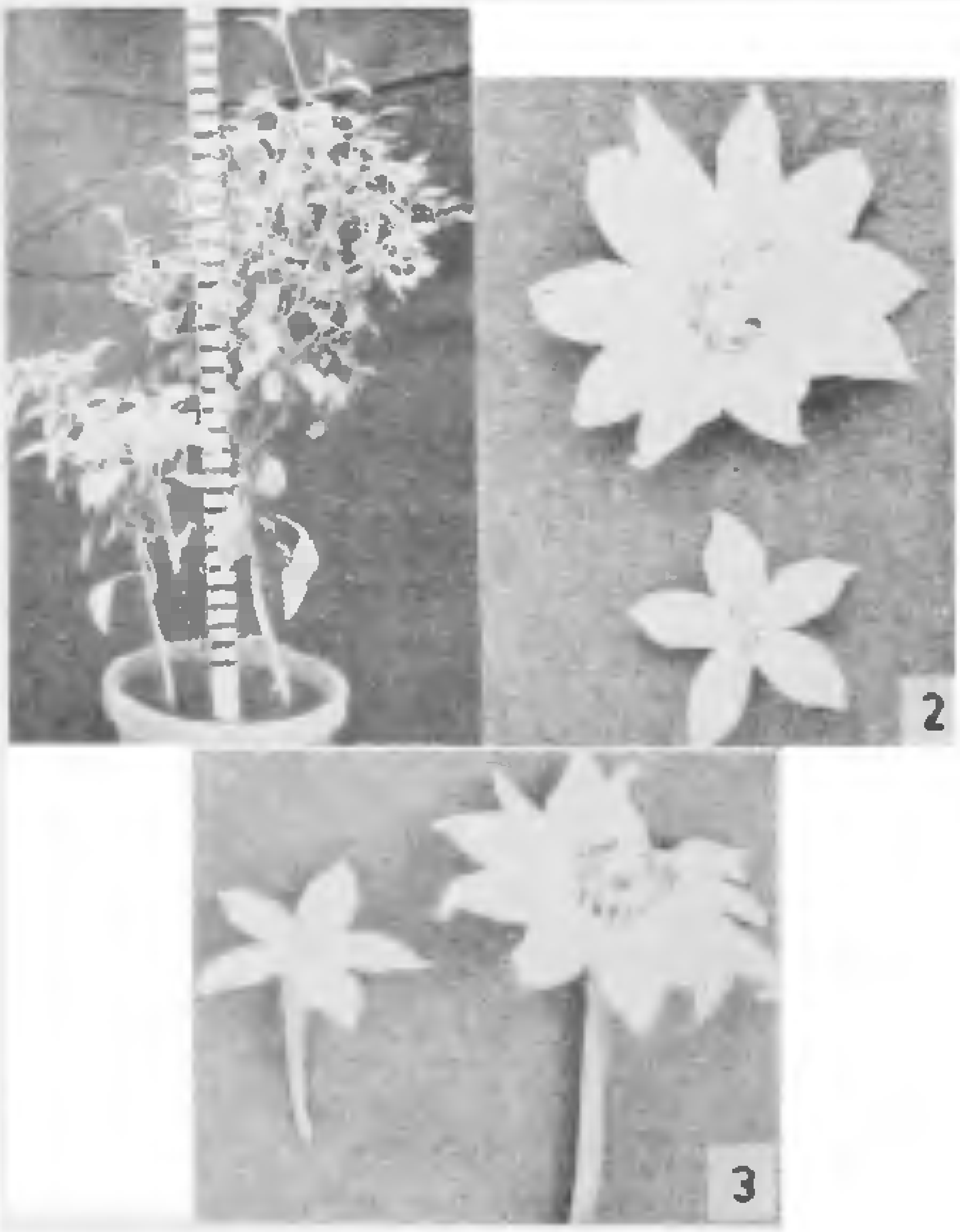
A comparison of morphological characters of the mutant and its control is set out in Table I. Phenotypically the mutant is distinct from the control in being taller and robust with profuse flowering and without any fruit set (Fig. 1). The significant floral changes in the mutant include remarkable increase in the size of the flower, multiplication in the number of floral parts, aestivation of petals, decrease in the size of anthers and difference in the shape and size of gynoecium (Table 1; Figs. 2, 3). Besides simulating an appearance of a single whorled *Chrysanthemum*, the flowers exhibited an unusual increase in the number of floral parts of all the whorls. In most of the flowers decamerous arrangement was recorded. However, in 5–10% of the flowers 11 or 12 petals were met with. All the sepals fused together resulting in a cup-like structure at the base of the flower, while in the control the arrangement conforms to petriform. The petals, are comparatively larger displaying imbricate aestivation instead of being valvate. Stamens, although epipetalous, are invariably smaller than those of the normal flowers (See Table I). Of all the parts of the flower, the gynoecium seems to have been involved in maximum alterations. The ovary is 10-carpellate and 10-loculed instead of being bicarpellary. The placenta is substantially large and all the ten carpels are arranged in a single whorl to surround it. The style which is relatively short, stout, cylindrical and fleshy is canopied by a fleshy, conical, cushion-like and lobed stigma which almost resembled that of a poppy.

Cytological studies disclosed normal behaviour of the meiotic chromosomes and organisation of 12 bivalents. Pollen fertility judged from stainability with 4% IKI solution is as high as 90·2%. Efforts

TABLE I

Comparison of floral mutant and its control for different morphological metrics

Sl. No.	Character	Control	Mutant
1.	Plant height	56·2 cm	71·1 cm
2.	Plant spread	53·4 cm	71·0 cm
3.	Number of branches	3	7
4.	Leaf length including petiole	6·0 cm	6·1 cm
5.	Leaf width	2·3 cm	2·5 cm
6.	Petiole length	1·8 cm	2·0 cm
7.	Stem girth	1·8 cm	2·0 cm
8.	Pedicel length	1·8 cm	2·5 cm
9.	Nature of calyx	Patriform	Cup-shaped
10.	Number of calyx lobes	5	10
11.	Petal length	0·85 cm	1·8 cm
12.	Petal breadth	0·4 cm	0·85 cm
13.	Number of petals	5	10-12
14.	Anther-lobe length	0·20 cm	0·15 cm
15.	Stamen length	0·50 cm	0·30 cm
16.	Style length	0·60 cm	0·25 cm
17.	Ovary diameter	0·20 cm	0·60 cm
18.	Number of carpels	2	10
19.	Number of locules	2	10



FIGS. 1–3. Fig. 1. Mutant (right) and control (left) of CA 960 variety. Fig. 2. Mutant (top) and control (bottom) flowers. Fig. 3. Control and mutant (right) flowers. Note the formation of 11 petals in the mutant.

of both selfing and crossing were infructuous and the mutant is sterile. However, it was possible to obtain a few fruits by employing this as male parent. Inheritance studies of the mutant are under progress. In the light of these observations—high pollen fertility and absolute want of fruit set—it should be inferred that the mutant is female sterile. The gene/genes accountable for bringing forth this variant condition is/are exerting influence on female fertility of the plant or *vice versa*. The infertility of the gynoecium could be due to its multicarpellary nature. Very recently Murty and Lakshmi[3] described a new type of female sterile mutant in *Capsicum* manifesting variation both in the shape and size of leaves and floral characters, besides exhibiting marked reduction in the size of the floral parts. In contrast, the mutant plant under study, displayed unusual increase in the number as well as size of the floral parts. Consequently it is inferred that the floral organogeny in *Capsicum* is perhaps an intricated process governed by polygenes and the mutations of these genes cause either an increase or decrease of the number and size of the floral parts together with the infertility of the ovary.

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GREEN COTYLEDON MUTANT IN MUNG BEAN [*VIGNA RADIATA* (L.) WILCZEK]

IN mung bean the cotyledons are normally yellow in colour and the seedcoat is green. A mutant with dark green seeds was isolated in the M_2 generation following exposure of dry seeds (11% moisture) to 3 krads of fast neutrons obtained from SNIF (Standard Neutron Irradiation Facility) which is installed in the APSARA Reactor of this Research Centre. On splitting the seeds of this mutant, cotyledons were found to be green in colour as compared to the yellow of the parental cultivar S-8. The mutant bred true in subsequent generations. Morphological characteristics, yield components, protein content, chlorophyll content in the seedcoat and cotyledons as well as the inheritance of the green cotyledon character are described in this communication.

Data on morphological characters and yield components recorded on the plants in the M_4 generation (Table I) show no significant variation between the mutant and parent, except in 100 seed weight which were lower for the mutant. Chlorophylls from the seedcoat and cotyledons were extracted separately in 80% acetone and their quantity estimated according to Arnon's method[1]. Chlorophyll content in the seedcoat of the mutant was marginally lower than that of the parent while the cotyledons of the mutant contained 20 times more chlorophyll (Table I). The chlorophyll *a/b* ratio in the cotyledons of the mutant was low indicating that more of chlorophyll *b* was present.

TABLE I

Comparative data on the agronomic characters and chlorophyll content of "green cotyledon" mutant and its parent variety

Character particulars	Variety	
	Parent	Mutant
Plant height (cm)	50·5±1·3	49·5±1·2
Days to flower	43	40
Number of nodes	7·6±1·6	8·0±1·5
Number of racemes	5·7±0·3	5·8±0·3
Number of pods	18·0±1·2	17·9±1·2
Number of seeds/pod	11·2±0·3	11·1±0·3
100 seed weight (gm)	3·9±0·2	3·5±0·1
Seed yield/plant (gm)	6·0±0·4	5·1±0·4
% seed protein	25·9	24·9
Chlorophyll content (Total chlorophyll per g.f. wt.)		
Seedcoat	184·6	176·4
Cotyledon	2·8	40·7
Chlorophyll *a/b*		
Seedcoat	1·4	1·5
Cotyledons	4·0	2·1

Morphological data mean of 20 plants.

The mutant was crossed reciprocally to the parent and to two other cultivars, ML-5 and PS-10. Seeds from all the four crosses were light green in colour with yellow cotyledones. The character being specific to the cotyledons, its segregation could be studied in the pods of the F_1 plants. The pooled data for each cross gave an excellent fit to a 3 : 1 phenotypic ratio (Table II), suggesting that the green cotyledon