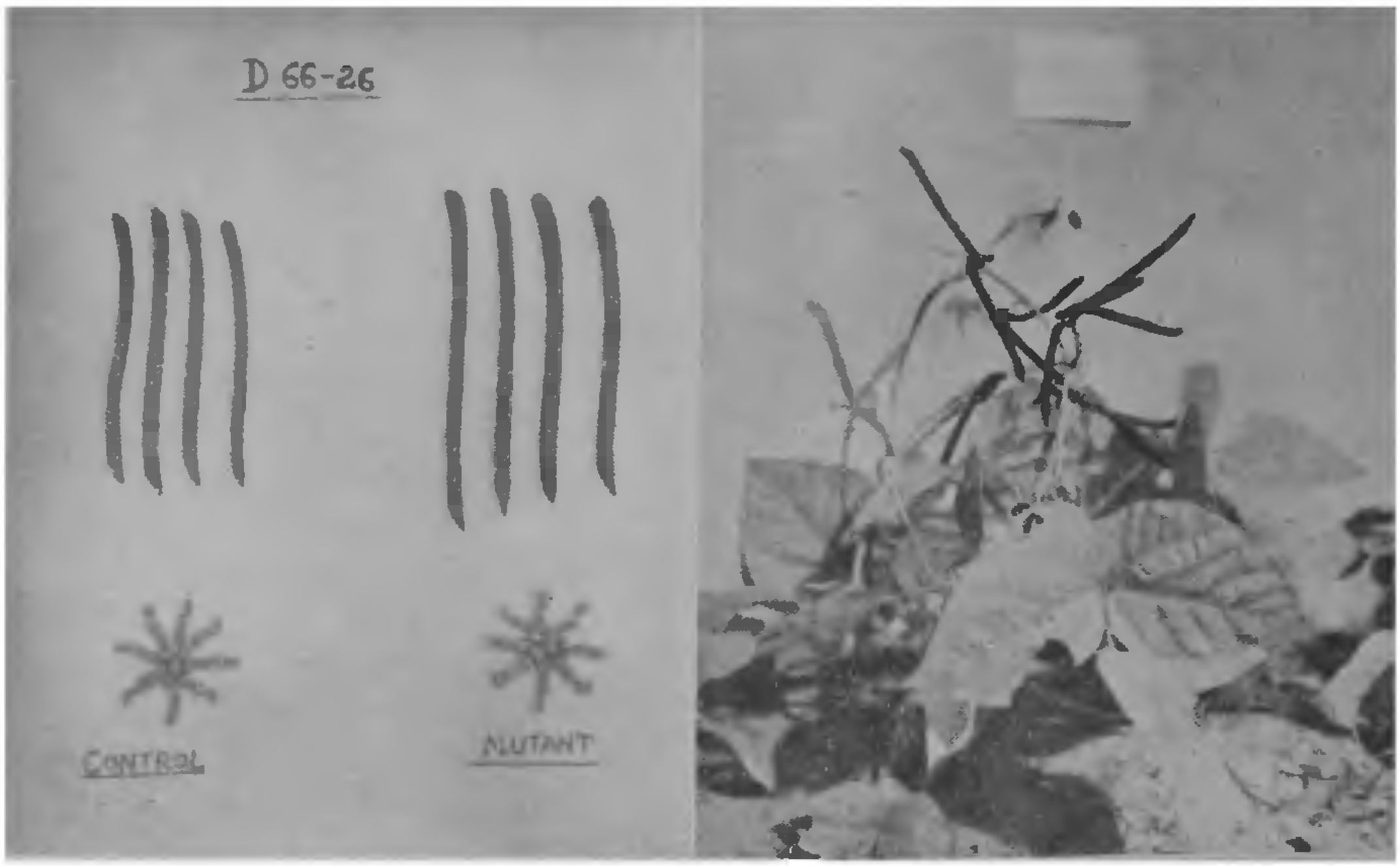
A GIANT VARIANT IN GREEN GRAM (*PHASEOLUS AUREUS* ROXB.)

STUDY of the effect of ionising irradiation as a tool for crop improvement has been successfully made in many leguminous crops. As a result of such irradiations some gigas mutants have been reported in Bengal gram[1-3].



FIGS. 1-2. Fig 1. Pods and grain of variant and Parent. Fig. 2. A single plant of variant showing large pods and leaves.

TABLE I

Comparison of the plant characters of variant and parent (average of 15 plants)

Name	Days to maturity	Plant height cm	No. of branches	No. of pods per plant	Pod length cm	No. of seeds per pod	Length of leaf cm	Breadth of leaf cm	Grain yield/ plant	1000 grain weight gms
Variant ..	58	29·14	5	25·60	10·06	12·50	11·03	10·31	13·64	82·05
Parent (D-66-26)	65	44·80	3	20·00	8·31	9·50	8·69	7·89	8·85	68·28

The present work was started in 1968 to evolve some useful mutations in green gram. A bold grained local selection D–66–26 was treated by different doses of gamma-rays, *i.e.*, (*i*) 10,000 *r*, (*ii*) 20,000 *r*, (*iii*) 30,000 *r*, and (*iv*) 40,000 *r* at IARI, New Delhi. The gamma garden facility provided by the IARI is gratefully acknowledged. As a result of these treatments the authors could isolate a very interesting "giant variant" from the M_1 generation of the 20,000 *r* treatment. This variant which was having parts much larger than those of the parent, manifested "gigantism" in almost all the plant characters except plant height as compared to the original parent, and is breeding true in the successive generations. It had extra long pods and very bold shining green grain, distinctly different from the parent (Fig. 1). The plant was dwarf and possessed profuse branching habit, broad and thick leaves with dark-green colour (Fig. 2). It displayed increase in many quantitative characters like number of pods per plant, pod length, number of seeds per pod, leaf size, grain yield per plant and 1000 grain weight (Table I). Flowers too were bigger in size and the colour of standard wings and keel was found to be lighter yellow in the variant, while the pollen fertility and seed setting were normal. It was 5

to 6 days earlier in maturity taking 56 to 58 days for complete maturity (Table I).

Table I indicates that this variant is superior to the parent in almost all the qualitative and quantitative characters. The 1000 grain wt. (82·05 gm) is exceptionally high for green gram. It may prove to be an important addition to the existing genetic variability in the crop, and can be profitably used as a donor parent for breeding economically superior genotypes.

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CARBARYL—A NEW CHEMICAL MUTAGEN

A number of farm chemicals used as pesticides, herbicides, and insecticides have been found to damage the chromosomes, interfere with normal cell division, or cause mutations of living organisms[1]. In order to determine the possible mutagenic effect of carbaryl (sevin), a common carbamate insecticide[2] that is widely used in crops like corn, potato, tomato, eggplant, asparagus, pepper, and other vegetables[3], 1 ppm, 5 ppm and 10 ppm of carbaryl was mixed with the culture media fed to wild type female *Drosophila* flies for 5 hours. The treated females were allowed to mate with wild type males and phenotypic and cytological observations were made on F_1 and F_2. The third instar larvae were used for the cytological investigation. The results are presented in Tables I and II. No phenotypic changes were observed in the treated females as well as in F_1 and F_2 generations of the control culture. All the concentrations of carbaryl under the study produced both phenotypic and chromosomal abnormalities. The treatment of 5 ppm carbaryl altered the normal sex expression by producing more males than females. Black-eyed and white-eyed flies were obtaned from all the treatments involving carbaryl. Interesting enough, the head of the white-eyed flies merged with the thorax thus rendering it difficult to differentiate between the two parts of the body. Chromosomal abnormalities included deficiency, duplication, inversion, reciprocal translocation, and asynopsis of homologous chromosomes. Inversion was the most frequent abnormality followed by deficiency. In general, chromosomal abnormalities were not too high in magnitude. However, carbaryl was considered to be a chemical mutagen for *Drosophila melanogaster*, the best subject for the analysis of mutagenic effects[4].

Table I

Effect of different treatments on the phenotype of the first and second filial generations of Drosophila melanogaster

Treatment	F_1					F_2				
	Sex expression		No. of flies with			Sex expression		No. of flies with		
	Male	Female	Red eye	Black eye	White eye	Male	Female	Red eye	Black eye	White eye
Control ..	84	120	204	..	..	82	91	173	..	..
1 ppm carbaryl ..	83	97	53	125	2	85	92	47	127	3
5 ppm carbaryl ..	109	93	163	39	..	113	86	155	42	2
10 ppm carbaryl ..	83	97	79	97	4	69	109	86	83	9

Table II

Cytological observations on the salivary gland chromosomes in F_1 and F_2 cells of D. melanogaster

	Treatment	Chromosome behaviour (number of cells)					
		Normal	Deficiency	Duplication	Inversion	Reciprocal translocation	Asynapsis
F_1	Control ..	53	..	..	1	..	1
	1 ppm ..	47	..	2	..	1	..
	5 ppm .	45	4	..	3	1	..
	10 ppm ..	61	1	..	5	..	2
F_2	Control ..	33	..	..	..	..	..
	1 ppm ..	37	1	1	3	..	..
	5 ppm ..	41	1	..	3	..	..
	10 ppm ..	48	..	..	2	1	..