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Co 4-A New High Yielding Drought Tolerant Greengram Variety

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The seed of cultivated long duration variety Co 1 was treated with gamma irradiation with an attempt to evolve a high yielding strain with short duration. A high yielding mutant (named Mutant 2) was isolated in the M_3 generation and evaluated in different seasons and its performance was compared with Co 3 and KM 2. The mutant was named Co 4 and it recorded 9.1 q/ha as against 7.1 and 6.1 for Co 3 and KM 2 respectively under rainfed cultivation. The strain is also resistant to tip blight, powdery mildew, root rot and mosaic virus.

In Tamil Nadu, greengram (*Vigna radiata* (L.) Wilczek) is grown in one lakh hectares with a production of 0.33 lakh tonnes. It is mainly grown under rainfed condition. The earlier breeding work has resulted in release of the strains Co 1, Co 2 and Co 3. Being a predominantly self fertilized crop, inherent variability in greengram is much circumscribed. The vulnerability of its flowers to artificial manipulation renders induction of variability through hybridization a laborious and limited exercise. Therefore, the adapted strain Co 1 was taken up for induced mutagenesis and the improved variety Co 4 released.

MATERIAL AND METHODS

The seeds of the variety Co 1 greengram was treated with gamma rays (0, 20, 40, 60, 80 and 100 kR). The preliminary studies have already been reported (Krishnaswami, *et al.* 1977) The plants under such treatment were carried forward to M_2 and M_3 generations. Then selections were made in M_3 generation for number of pods and they were tested in replicated yield trials from 1973 onwards. Of these different selections, Mutant 2 was found to be promising and the same has been released as Co 4 greengram for general cultivation.

RESULTS AND DISCUSSION

Mutant 2 greengram was tested for its yield potential under both rainfed and irrigated conditions at Millet Breeding Station, Coimbatore. This culture was tested under irrigated condition for three seasons from 1973 to 1974 against Co 3 and under rainfed conditions from 1974 to 1980 for 12 seasons. It gave a mean grain yield of 1422 kg/ha representing an yield increase of 21 per cent over Co 3. under irrigated condition. It has recorded a mean grain yield of 1004 kg/ha representing an increase of 36 per cent over Co 3, 86 per cent over KM 1 and [illegible] per cent over KM 2 under rainfed [illegible] culture was also [illegible] o 1981 at other [illegible] viz. Bhavanisagar, [illegible] tti, Kaveripattinam [illegible] n for a total of 14 [illegible] and it has recorded [illegible] 41 kg/ha representing

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an yield increase of 25 per cent over Co 3 under rainfed conditions. Under rice fallow condition, it has recorded a mean grain yield of 592 kg/ha representing an increase of 38 per cent over ADT 1 and 41 per cent over KM 2.

This culture was tested in 60 trials at farmers' holdings under rainfed condition and 12 trials under irrigated condition. It gave a mean grain yield of 854 kg/ha representing an increase of 20 per cent over Co 3 and 63 per cent over KM 1 and 64 per cent over KM 2, under rainfed condition. Under irrigated condition, it gave a grain yield of 1676 kg/ha representing an increase yield of 34 per cent over Co 3 and 70 per cent over KM 2.

The overall performance of this mutant compared with Co 3, KM 1 and KM 2 under various trials is presented in tables 1 to 3. The description of this variety is given in table 4 This strain matures in 85 days. Plants are erect and compact in habit Grains possess good cooking quality with pleasant flavour, colour and taste (Neelakantan, *et al.*, 1977). It is rich in protein (28.9 per cent) compared to 26.8 per cent for Co 2 and 26.1 per cent for Co 3 with easy digestibility owing to low carbohydrate content. It is resistant to tip blight, powdery mildew, root rot diseases and also to mosaic virus. The reaction to diseases of this mutant is given in table 5.

This variety is acceptable to farmers, consumers and industry. It gives higher grain yield than the ruling varieties and rich in protein.

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Table-1. Mean performance of Mutant 2 Greengram under rainfed condition

Particulars	No. of trials	Grain yield kg/ha			
		Mutant. 2	co. 3	KM 1	KM. 2
Coimbatore Campus	12	1004	737	540	697
University Research Stations	14	941	754	—	—
Coordinated Trials	6	824	614	560	595
Adaptive Research Trials and trials in farmer's holdings	60	854	713	465	522
Overall Mean	—	906	705	522	605
Duration (days)	–	85	75	65	65
Per day Productivity kg/ha	—	10.7	9.4	8.0	9.3

Table-2 Mean performance of Mutant 2 under irrigated condition

Particulars	No. of trials	Grain yield kg/ha		
		Mutant. 2	co. 3	KM. 2
Coimbatore campus	4	1422	1179	—
Adaptive Research trials and trials in farmers holding	12	1676	1252	985
Overall Mean	—	1549	1216	985
Duration (days)	—	85	75	65
Per day productivity kg/ha	—	18.2	16.2	15.2

Table-3 Mean performance of co 4 under rice fallows

Entries	yield (kg/ha)	Duration (days)	Per day production (kg/ha)
Mutant. 2 (Co4)	592	87	6.8
Co. 3	375	80	4.7
KM-1	350	70	5.0
KM-2	419	70	6.0
ADT-1	430	91	4.7

Table-4 Characters of greengram mutant 2 with 2 co 3

Particulars	Mutant 2	Co 3
Plant height (cm)	80.4	40.1
No. of branches/plant	3.6	2.9
No. of clusters/plant	9.7	5.7
No of pods/plant	38.9	15.4
Pod length (cm)	7.6	7 8
No. of seeds/pod	11.2	11.4
100 grain weight (g)	4.1	4.0
Seed yield plant (g)	11.4	6.5
Duration (days)	85	73
Moisture %	8.0	7.7
Protein %	28 0	26.1
Fat %	0.9	0.9
Ash %	3.4	3.3
Carbohydrate %	58.1	61.0
Water absorption	158	180
Cooking time(minutes) Open vessel	30	22
Cooking time(minutes) Pressure cooker)	3	3
Solid loss in cooking water (g/100 ml)	1 9	1.9
Colour score	66	18
Flavour score	54	55
Taste score	63	42
Overall score	6	5

Table-5 Reaction to Disease (Percentage of infection)

Disease	Mutant-2	CO-2	CO-3	KM-1	KM-2
Tip blight	3·6 (R)	12 5 (MS)	7.2 (MR)	12.5 (MS)	3.5 (R)
Powdery mildew	2.0 (R)	7.5 (R)	5.9 (R)	6 0 (R)	4 5 (R)
Root rot	1.5 (R)	6 8 (R)	5 2 (MR)	2.5 (R)	2 8 (R)
Leaf crinkle virus	12 8 (MS)	15.5 (MS)	11.5 (MS)	15 0 (MS)	8 6 (MR)
Yellow mosaic virus	8.1 (MR)	10.5 (MS)	9 6 (MR)	7.5 (MR)	5 5 (MR)

R—Resistant; MR—Moderately Resistant; MS—Moderately Suscepible