



BGM 547 — A high yielding chickpea (*Cicer arietinum* L.) mutant variety for late sown condition in north western plain zone of India

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Chickpea or Bengal gram (*Cicer arietinum* L) is the third most important pulse crop worldwide and has been recognized as a valuable source of protein particularly in developing countries. India, with 5.79 million tonnes of production from 7.12 million hectare, is the largest contributor of world chickpea production and predominates in the global supply (contributing over 66 % of global output). In spite of the above facts, the productivity of chickpea is still very low. This important crop is grown mostly as a rainfed crop under the reserve moisture in the post rainy season in semi-arid tropics and spring and winter season in the temperate mediterranean type of climate. The area of chickpea has substantially decreased during past three decades due to low productivity which is largely because of severe biotic and abiotic stresses this crop has to face. Since the role of improved varieties in increasing productivity is evident, the development of high yielding and disease resistant varieties with wider adaptability is the main focus of the breeders. Mutation breeding is an established tool to develop new varieties which are high yielding and resistant to major diseases and pests with wider adaptability [1]. Three chickpea mutant varieties Pusa 408, Pusa 413 and Pusa 417, the first ever examples of micro-mutant varieties in chickpea in the world, developed at IARI, New Delhi were released first time in India through mutation breeding during 1985 following gamma irradiation [2]. Further efforts in this direction has led to development of a new chickpea

mutant variety BGM 547 which was identified for release very recently in the year 2005.

The parent variety BG 256 was exposed to gamma irradiation with a dose of 300 Gy and a bold seeded high yielding mutant was isolated in M₂ generation. The pedigree selection method was followed in subsequent generations, which led to the development of BGM 547. The variety BGM 547 featured with high yield potential of > 30 q/ha in late sown conditions, bold grain size and attractive golden brown colour, tolerant to major diseases and pests, was therefore identified for the farmers cultivation. It gave consistently a good yield of 1800 kg/ha over three years of Coordinated Varietal Trials in late sown conditions in NPWZ (Table 1). The yield potential was found to be 3064 kg/ha at one of the location (Pantnagar) during rabi 2004-05. An average yield superiority of 15.84% was recorded over all the national check varieties: BG 372 (10.63%), RSG 963 (16.58%), H 82-2 (17.34%) and PBG 1 (18.81%) (Table 1).

The seed coat colour of BGM 547 is very attractive and of golden brown colour. The seed size is also bold (25g) ranging from 15.9-30.0 g over the locations during three years of testing. Seed size has shown 35.7 % to 90 % superiority over the released check varieties prevailing in the zone (Table 2). The variety BGM 547 has performed moderately resistant reaction

Table 1. Performance of mutant variety BGM 547 along with check varieties in North Western Plain Zone during 2002-2005

Variety	Yield: kg/ha				
	2002-2003 (IVT)	2003-2004 (AVT I)	2004-2005 (AVT II)	Weighted mean over three years	Superiority % over checks
BGM 547	1677 (6)	1864 (5)	1860 (7)	1800 (18)	-
PBG 1 (ch)	1462 (6)	1440 (5)	1613 (7)	1515 (18)	+ 18.81
BG 372 (ch)	1552 (6)	1544 (5)	1750 (7)	1627 (18)	+ 10.63
H 82-2 (ch)	1466 (6)	1626 (5)	1528 (7)	1534 (18)	+ 17.34
RSG 963 (ch)	-	-	1544 (7)	1544 (7)	+ 16.58

Note: Data in parenthesis indicates No. of locations

Table 2. Performance of BGM 547 along with check varieties in North Western Plain Zone during 2002-2005

Variety	100 seed weight (g)				Superiority % over checks years
	2002- 2003 Zonal mean	2003- 2004 Zonal mean	2004- 2005 Zonal mean	Weighted mean over three years	
BGM 547	24.5 (6)	24.7 (5)	25.8 (7)	25.1 (18)	-
PBG 1 (ch)	13.5 (6)	12.1 (5)	13.7 (7)	13.3 (18)	+88.7
BG 372 (ch)	12.4 (6)	12.4 (5)	14.4 (7)	13.2 (18)	+90.1
H 82-2 (ch)	14.8 (6)	14.0 (5)	16.1 (7)	15.2 (18)	+65.1
RSG963(ch)	-	-	18.5 (7)	18.5 (7)	+35.7

Note: Data in parenthesis indicates No. of locations

with genetically improved traits like high yield potential, bold attractive golden brown grains, the variety BGM 547 will be a good replacement of the prevailing popular varieties in the zone. Keeping in view its colourful, bold seeds with thin testa and good cooking quality, it will prove an ideal variety, which will attract farmers for its cultivation and fetch a good return in the market.

References

1. **Kharkwal M. C., Jain H. K. and Sharma B.** 1988. Induced mutations for improvement of chickpea, lentil, pea and cowpea. Proc. FAO/IAEA Workshop on Improvement of Grain Legumes Production Using Induced Mutations. 1-5 July, 1986, Pullman, Washington (USA), IAEA, Vienna, 89-109.

Table 3. Performance of BGM 547 along with check varieties in North Western Plain Zone against diseases during 2003-2005

Variety	Disease incidence in %/R/MR							
	2003-2004 (AVT I)			2004-2005 (AVT II)		Mean over two years	2003-2004 (AVT I)	
	Ludhiana (Wilt)	Faridkot (Wilt)	New Delhi (Wilt)	Faridkot (Wilt)	New Delhi (Wilt)		Root rot (Hisar)	Stunt (Jungadh) (hot spot)
BGM 547	31.0	30.0	25.0	38.9	45.3	34.0 (5)	MR	16.0
PBG 1 (ch)	21.1	36.0	18.5	-	-	35.0 (3)	R	10.0
BG 372 (ch)	14.8	29.0	28.9	-	-	24.2 (3)	-	-
H 82-2 (ch)	15.0	29.2	20.0	-	-	21.4 (3)	MR	16.6
RSG 963 (ch)	-	-	-	54.4	94.0	74.2 (2)	-	-
L 550/JG 62 (Suscp. ch)	-	100.0	-	98.0	-	99.0 (2)	-	-
LSI	28.6	38.7	26.6	39.9	61.6		23.7	27.4

Note : Data in parenthesis indicates No. of locations; R = Resistant (0-10 % Diseases incidence); MR = Moderately Resistant (10-20% Diseases incidence)

Table 4. Performance of BGM 547 along with check varieties in North Western Plain Zone against pod borer (*Helicoverpa armigera*) during 2003-2004 (pod borer incidence %)

Variety	Ludhiana		Sriganganagar		Durgapura		Mean over locations	
	PD (%)	PSR	PD (%)	PSR	PD (%)	PSR	PD (%)	PSR
BGM 547	29.2 (92.6)	4	13.7 (21.7)	6	23.9	8	22.4	6.0
PBG 1 (ch)	38.5 (38.3)	5	12.8 (21.1)	6	22.0	8	24.4	6.3
BG 372 (ch)	34.2 (35.7)	4	14.1 (22.1)	-	17.4	-	21.9	4.0
Infestor	48.8 (44.3)	6	-	-	-	-	48.8	6.0
CD at 5%	3.8	-	-	-	-	-	-	-

Note : Data in parenthesis indicates angular transformed values

toward major diseases like wilt, root rot and stunt as compared to the check varieties in All India Coordinated Trials over 2003-2005 (Table 3). The variety has also shown consistently moderate resistant reaction towards the pod borer *Helicoverpa armigera* incidence in all the locations of North Western Plain Zone during *rabi* 2003-2004 (Table 4). Being recommended for the late sown conditions, it will be suitable for sowing in different cropping systems prevailing in the zone especially after the harvest of rice/potato in the fields. Being endowed

2. **Kharkwal M. C., Pandey R. N. and Pawar S. E.** 2004. Mutation Breeding for Crop Improvement. In: Plant Breeding — Mendelian to Molecular Approaches, (eds) Jain, H. K. and Kharkwal M. C. Narosa Publishing House, New Delhi, Pp. 601-646.
3. **Annual Report 2002-2003.** All India Coordinated Research Project on Chickpea, IIPR, Kanpur 208 024.
4. **Annual Report 2003-2004.** All India Coordinated Research Project on Chickpea, IIPR, Kanpur 208 024.
5. **Annual Report 2004-2005.** All India Coordinated Research Project on Chickpea, IIPR, Kanpur 208 024.