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# VBN (Bg) 4 Black gram : A high yielding Yellow Mosaic Resistant Variety

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**Abstract: The black gram genotype VBG 55 is a hybrid derivative of CO 4 x PDU 102. It matures in 75-80 days. It has recorded an average seed yield of 782, 737 and 793 kg/ha during kharif, rabi and summer seasons respectively. It is an increased seed yield of 52.4, 67.8, 73.8 per cent over Vamban 1, 50.5, 34.3, 45.7 per cent over Vamban 2, 19.3, 20.2, 21.2 over Vamban 3, 78.6, 27.1, 43.8 over CO 5 and 31.4, 28.5, 28.7 over ADT 5 during *kharif, rabi* and summer seasons respectively. The culture VBG 55 has resistance to yellow mosaic virus disease and moderate resistance to powdery mildew. It is suited for sowing in all seasons and all districts of Tamiil Nadu. Hence, the culture VBG 55 was accepted by State Variety Release Committee as VBN (Bg) 4 blackgram for commercial cultivation in Tamil Nadu during 2003.**

*Key words : VBN (Bg) 4, black gram, yellow mosaic virus resistance.*

## Introduction

Black gram (*Vigna mungo* L. Hepper) is an important pulse crop in Tamil Nadu. The area under blackgram in the state is around 4.46 lakh hectare with a production of 2.06 lakh tons. It accounts for an average productivity of 461 kg $ha^{-1}$ (Dixit *et al.* 2000). The state average of blackgram is just above the National average productivity of 448 kg $ha^{-1}$. However, it is lesser than states like Bihar (694 kg $ha^{-1}$), Maharastra (631 kg $ha^{-1}$), Gujarat (601 kg $ha^{-1}$) and Andra Pradesh (555 kg $ha^{-1}$) (Kannaiyan 2000).

The yield of blackgram is low over locations and seasons due to its susceptibility to environmental stresses and diseases. So to improve the productivity of blackgram, intensive breeding programme was initiated at National Pulses Research Centre (NPRC), Vamban. This has resulted in evolution of the culture VBG 55. This was accepted by State Variety Release Committee and released as VBN (Bg) 4 during 2003 for cultivation through out Tamil Nadu.

## Materials and Methods

The VBG 55 blackgram culture was evolved at NPRC, Vamban. It is a cross derivative of CO 4 and PDU 102. The crosses were made between these two parents and selections made from $F_2$ onwards. After attaining homozygosity in $F_5$, the culture VBG 55 and checks Vamban1, Vamban 2, Vamban 3, CO5 and ADT 5 were evaluated in station trials at NPRC, Vamban from 1995 to 2002. The culture was tested in MLT during 1998 - 2000 and in ART during 2000 - 2001 in farmers holdings of different districts. On Farm Trials were also conducted in farmers holdings of Pudukkottai district during rabi 2001 - 02. The Vamban centre is the hot spot for yellow mosaic virus disease (YMV) and powdery mildew during *kharif* and *rabi* seasons respectively. Hence the culture VBG 55 and check varieties were evaluated for their resistance to YMV and powdery mildew at Vamban during *kharif* 2002 and rabi 2001 - 02 seasons respectively. Pod borer damage was estimated from the pods collected from

**Table 1.** Over all performance of black gram culture VBG 55 for seed yield in various trial.

| Trial | No.of trials | VBG 55 | Vamban 1 (ch) | Vamban 2 (ch) | Vamban 3 (ch) | CO 5 (ch) | ADT 5 (ch) |
|---|---|---|---|---|---|---|---|
| *Kharif* | | | | | | | |
| Station (1995-2001) | 7 | 890 | 513 | 558 | 613 | 336 | - |
| MLT (1998) | 7 | 659 | - | 481 | - | 540 | - |
| ART (2000) | 36 | 785 | - | - | 664 | - | 595 |
| Mean | 50 | 782 | 513 | 520 | 656 | 438 | 595 |
| Per cent increase | - | - | 52.4 | 50.5 | 19.3 | 78.6 | 31.4 |
| *Rabi* | | | | | | | |
| Station (1996 - 2001) | 4 | 618 | 466 | 497 | 574 | 529 | - |
| MLT (1999-00) | 7 | 822 | - | 631 | - | 665 | 585 |
| ART (2000-01) | 25 | 729 | - | - | 668 | - | 615 |
| OFT (2001-02) | 10 | 743 | - | - | 637 | - | - |
| Mean | 46 | 737 | 466 | 582 | 650 | 616 | 608 |
| Per cent increase | - | - | 67.8 | 34.3 | 20.2 | 27.1 | 28.5 |
| *Summer* | | | | | | | |
| Station (1996-2001) | 4 | 710 | 450 | 480 | 590 | 580 | 550 |
| MLT (1999) | 7 | 667 | - | 569 | - | 523 | 549 |
| ART (2001) | 17 | 865 | - | - | 658 | - | 645 |
| Mean | 28 | 793 | 450 | 537 | 645 | 544 | 607 |
| Per cent increase | - | - | 73.8 | 45.7 | 21.2 | 43.8 | 28.7 |

**Table 2.** Reaction of black gram culture VBG 55 against diseases and pod borer at Vamban

| Disease/Pest | VBG 55 | Vamban 1 (ch) | Vamban 2 (ch) | Vamban 3 (ch) | CO 5 (ch) | ADT 5 (ch) |
|---|---|---|---|---|---|---|
| Yellow mosaic virus (*Kharif* 2002) | 1 | 3 | 3 | 3 | 9 | 5 |
| Powdery mildew (*Rabi* 2000-01) | 3 | 3 | 5 | 3 | 7 | 5 |
| Pod borer damage (%) (*Kharif* 2002) | 9.5 | 16.7 | 15.3 | 13.0 | 11.0 | 14.3 |

Disease score : 1- Resistant; 3 - Moderately resistant; 5 - Moderately susceptible; 7 - Susceptible; 9 - Highly susceptible

the unsprayed plots of various genotypes at Vamban during kharif 2002.

## Results and Discussion

The culture VBG 55 was tested in various trials and results presented in Table 1.

### *Station Trails*

The culture VBG 55 was tested at NPRC, Vamban from 1995 to 2001. It recorded an average seed yield of 890 kg/ha during kharif season which is 73.5, 59.5, 45.2 and 164.9 per cent increased yield over the checks Vamban 1 (513 kg/ha), Vamban 2 (558 kg/ha), Vamban 3 (613 kg/ha) and CO 5 (336 kg/ha) respectively. Due to high yield potential and YMV resistance, the culture VBG 55 recorded higher yield than other genotypes. The check variety CO 5 is highly susceptible to the yellow mosaic virus disease at Vamban during *kharif* season and hence severe yield reduction was observed. In rabi season, the culture VBG 55 recorded 618 kg/ha during rabi season which is 32.6, 24.3, 7.7 and 16.8 per cent increased seed yield over the checks Vamban 1 (466 kg $ha^{-1}$), Vamban 2 (497 kg $ha^{-1}$), Vamban 3 (574 kg $ha^{-1}$) and CO 5 (529 kg $ha^{-1}$) respectively. The culture VBG 55 also recorded higher seed yield (710 kg $ha^{-1}$) during summer season which is 57.8, 47.9, 20.3, 22.4 and 29.1 per cent increase over the checks Vamban 1 (450 kg $ha^{-1}$), Vamban 2 (480 kg $ha^{-1}$), Vamban 3 (590 kg $ha^{-1}$), CO 5 (580 kg $ha^{-1}$) and ADT 5 (550 kg $ha^{-1}$) respectively.

### *Multilocation Trials*

The culture VBG 55 was tested in multilocation trials during *kharif* (1998) *rabi* (1999 - 00) and summer (1999). With regard to the season wise performance, VBG 55 recorded 659, 822, 667 kg $ha^{-1}$ during *kharif, rabi* and summer seasons respectively. It is 37.0 and 22.0 per cent increase over Vamban 2 and CO 5 respectively during kharif season, 30.3, 23.6 and 40.5 per cent increase over Vamban 2, CO 5 and ADT 5 respectively during rabi season and 17.2, 27.5 and 21.5 per cent increase over Vamban 2, CO 5 and ADT 5 respectively during summer season.

### *Adaptive Research Trails*

The culture VBG 55 was tested in Adaptive Research Trials during 2000-2001 at farmers holdings. This culture recorded an average yield of 785, 729 and 865 kg $ha^{-1}$ in *kharif, rabi* and summer seasons respectively. It is 18.2 and 31.9 per cent increase over Vamban 3 and ADT 5 respectively during *kharif* season, 9.1 and 18.5 per cent increase over Vamban 3 and ADT 5 respectively during rabi season, 31.5 and 34.1 per cent increase over Vamban 3 and ADT 5 respectively during summer season. The genotype VBG 55 consistenly recorded superior seed yield than the check varieties in multilocation trials also.

### *On Farm Trials*

The VBG 55 culture was also tested in On Farm Trials at the farmers holdings of Pudukkottai district during 2002. This culture recorded an average grain yield of 743 kg/ha which is 16.6 per cent increased yield over the check variety Vamban 3 (637 kg/ha).

### *Over all performance*

The black gram culture VBG 55 recorded superior seed yield in all the seasons and trials. It has recorded an average seed yield of 782, 737 and 793 kg $ha^{-1}$ during kharif, rabi and summer seasons respectively. It is an increased seed yield of 52.4, 67.8, 73.8 per cent over Vamban 1, 50.5, 34.3, 45.7 per cent over Vamban 2, 19.3, 20.2, 21.2 over Vamban 3, 78.6, 27.1, 43.8 over CO 5 and 31.4, 28.5, 28.7 over ADT 5 during *kharif, rabi* and summer seasons respectively.

### *Reaction to pest and diseases*

The culture VBG 55 is highly resistant to yellow mosaic virus disease (score 1) when

**Table 3.** Physical characteristics of blackgram dhal

| Characters | VBG 55 | Vamban 3 (ch) |
|---|---|---|
| Length (cm) | 0.53 | 0.47 |
| Breadth (cm) | 0.47 | 0.35 |
| Thickness (cm) | 0.15 | 0.15 |
| 1000 grain weight (g.) | 21.11 | 19.63 |

**Table 4.** Cooking characteristies of black gram dhal

| Particulars | VBG 55 | Vamban 3 (ch) |
|---|---|---|
| Initial weight of dhal (g) | 100 | 100 |
| Soaking period (hrs) | 4 | 4 |
| Initial volume of water added (ml) | 300 | 300 |
| Water absorption (ml) | 140 | 145 |
| Weight of gram after soaking and dehusking (g) | 200 | 190 |
| Weight of batter (g) | 360 | 350 |
| Volume of water added during grinding (ml) | 50 | 50 |
| Weight of salt added (g) | 5 | 5 |
| Number of pieces | 13 | 12 |
| Weight of one piece (g) | 18 | 14 |

**Table 5.** Organoleptic characteristies of idli

| Particulars | VBG 55 | Vamban 3 (ch) |
|---|---|---|
| Initial volume of batter (ml) | 100 | 100 |
| Final volume of batter (ml) | 160 | 149 |
| Weight of the idli (g) | 31 | 32 |
| Volume of the idli (ml) | 54 | 52 |
| Bulk density of idli | 0.57 | 0.62 |

compared to the susceptible check variety CO 5 (9 score) during *kharif* season. For powdery mildew disease, the culture VBG 55 was moderately resistant (3 score), where as the check CO 5 (7 score) showed susceptibility during *rabi* season. Considering reaction to pod borer damage the culture recorded 9.5 per cent damage where as the checks ranging from 11.0 (CO 5) to 14.3 (ADT 5) per cent respectively (Table 2).

*Morphological characters*

The black gram culture VBG 55 has medium duration (75 - 80 days) like CO 5 which is 10 - 15 days longer than other varieties. It has erect habit with 30 - 35 pods per plant.

The 50% flowering is 35-40 days. The pods are glabrous like Vamban 2 with black colour seeds. Hundred seed weight is 4.8 g. The crop has the habit of late senescence of leaves.

*Physical, cooking and organoleptic characteristics*

The seeds of VBG 55 contain higher protein (18.9 per cent) than the check variety Vamban 3 (17.0 per cent). The length, breadth and 1000 grain weight of the split dhal and batter weight was the highest in the culture VBG 55 than the check Vamban 3. The score card with respect to colour, flavour, texture, taste and over all acceptability was higher for VBG 55 than Vamban 3. The quality of idli is also found good since the bulk density of the culture VBG 55 is lesser than Vamban 3 (Table 3, 4 and 5).

Hence in view of its superior seed yield over many trails, resistance to YMV, moderate resistance to powdery mildew, this black gram culture VBG 55 was accepted by State Variety Release Committee as VBN (Bg) 4 blackgram for commercial cultivation in Tamil Nadu during 2003.

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