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Development of high yielding with durable resistance against Mungbean yellow mosaic virus genotypes in Blackgram

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Abstract

The Blackgram culture VBG04-008 is a cross derivative of blackgram Vamban 3 x *Vigna mungo* var. *silvestris* 8 is released as TNAU blackgram VBN (Bg) 7 maturing in 65-70 days with an average height of 17 cm and suited for cultivation under both under rainfed and irrigated conditions. It has a yield potential of 981 Kg per hectare. This culture is resistant to Yellow Mosaic Virus, Powdery mildew and Leaf Curl Virus and less damage of pod borer. It possesses desirable characters like high protein content (21.05%), crude fibre (5.90g/100g) and iron (3.76 mg/100g). Grains are medium sized with black in colour. It is recommended for cultivation in Tamil Nadu, Andhra Pradesh, Karnataka and Orissa.

Keywords: VBG04-008; Blackgram; VBN 7 Mung Bean Yellow Mosaic Virus; Powdery mildew-Rainfed; Irrigated

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Introduction

Blackgram *Vigna mungo* (L.) popularly known as urdbean in India. Pulses are important source of dietary protein for majority of population of Indian sub-continent. Since, they are characterized by high protein content (20 - 25

%), on average 2 to 3 times higher than major cereals, pulses are of particular importance to low income countries where the major sources of protein are non-animal products [1]. The area for blackgram cultivation in Tamil Nadu is about 3.5 lakhs ha. The greengram and blackgram crops are susceptible to MYMV disease which leads to 100 per cent yield

reduction. Farmers are getting reluctant to grow next season. Farmers are being raised quarries to scientists to develop Yellow Mosaic Virus resistant variety for cultivation or alternate resistant variety for removing susceptible varieties in cultivation.

The productivity of pulses is very low and unstable, as these crops encounters various biotic constrains. The most serious disease of blackgram is Yellow Mosaic Virus. Various national and international breeding programmes have put considerable efforts on host plant resistance; they have made progress in identifying resistance sources and their use in genetic enhancement [2]. The objectives of the study are to develop high yield with Yellow Mosaic Virus resistant varieties in blackgram. The interspecific hybridization has been initiated between *Vigna mungo* var. *silvestris* 8. Since resistant source is available in wild species *Vigna*. The cultivated blackgram types have been developed from the interspecific derivatives and resulted in new variety high yielding blackgram variety VBN(Bg) 7 with MYMV resistance released to forming community [3,4].

Materials and Methods

Crossing programme was started during season between Vamban 3 with *Vigna mungo* var. *silvestris* 8. The F1 to F6 generation was studied at Tamil Nadu Agricultural University, Coimbatore, Primary and Advanced Yield Trials (PYT & AYT) were conducted in Randomized Block Design with three replications along with local check variety at National Pulses Research Centre, Vamban from season. The culture VBG04-008 was further tested under multilocation trial (MLT) at different research stations of the Tamil Nadu Agricultural University during *Kharif* season [5-7]. It was promoted to Adaptive Research Trial (ART) during Kharif seasons and was tested under farmers holdings in collaboration with State Department of Agriculture and All India Coordinated Trial season. Laboratory studies were conducted to evaluate the quality

traits viz. protein (Kelplus), Crude Fibre (Kelplus), Iron (AASPEC), Phosphorus (AASPEC) and Ash (AASPEC) available at Home Science College, AC&RI, Madurai.

Result and Discussion

In the research station trials the culture VBG04-008 has recorded 955 kg/ha which is 20.42% and 30.46% increased yield over the local checks Vamban 3 (793 kg/ha) and VBN (Bg) 4 (732 kg/ha) respectively. In Multilocal trial the culture VBG04-008 has recorded 783 kg/ha which is 15.31 and 11.55 per cent increase over the checks ADT 5 (679 kg/ha) and CO 5 (702 kg/ha) (Table 1). This results in agreed with VBN 8 or Vamban 8 blackgram [8].

Under irrigated condition the culture VBG04-008 performed well by recording 961 kg/ha with an increase of 46.91% over Pant U 30, 46.71% over RBU 38 and 60.7% over TPU, 31.28% over VBN (Bg) 4, 41.53% over ADT 5 and 36.89% over CO 5 (Table 2). The same result revealed in Vamban 8 blackgram [8].

Under rainfed condition, the culture VBG04-008 has recorded 882 kg/ha with 15.29% and 15.54% yield increase over the check varieties Vamban 4 (765 kg/ha), and CO 5 (744 kg/ha) respectively (Table 3).

Table 3: Performance of blackgram VBN 7 (culture VBG04-008) at Rain fed conditions.

Trials	Yield (Kg/ha)		
	VBG04-008	VBN((Bg)4	CO 5
ART	826	745	744
OFT	937	785	-
Mean	882	765	744
% increase over the checks		15.29	15.54

Table 1: Over all trial abstract of performance of Blackgram VBN 7 (VBG04-008) in various trials.																			
Trials	No. of trials/ Locations (142)	Yield kg/ha																	
		VBG 04-008	VBN 3	VBN(Bg)4	ADT5	CO5	IPU 2-43	Pant U 30	TPU 4	RBU 38	Uttara	WBU -108	KU96-3	TPU	WBU -109	Pant U 31	PU 30	TU 94-2	NUL 7
IVT- Ist year results																			
South zone	10	826	-	-	-	-	830	711	-	-	-	-	-	-	-	-	-	-	-
Central zone	6	1239	-	-	-	-	-	-	1040	655	-	-	-	-	-	-	-	-	-
North West Plain Zone	5	1199	-	-	-	-	-	-	-	-	1179	889	-	-	-	-	-	-	-
AVT- Ist year results																			
South zone	5	772	-	-	-	-	690	597	-	-	-	-	-	-	-	-	-	-	-
Central zone	7	923	-	-	-	-	-	-	-	-	-	-	907	906	-	-	-	-	-
North East Plain Zone	3	1097	-	-	-	-	-	-	-	-	1090	-	-	-	826	--	-	-	-
North West Plain Zone	5	984	-	-	-	-	-	-	-	-	-	653	-	-	-	1009	-	-	-
AVT-1 - IInd year results																			
North West Plain Zone	5	1155	-	-	-	-	-	-	-	-	1129	921	-	-	-	1110	-	-	-
North East Plain Zone	5	1062	-	-	-	-	-	-	-	-	1160	994	-	-	-	-	-	-	-
AVT-2 - IIIrd year results																			
Central zone	8	1223	-	-	-	-	-	-	1024	-	-	-	1095	-	-	-	-	-	1271
South zone	5	737	-	-	-	-	770	-	-	-	-	-	-	-	-	-	662	781	-
Station	4	955	793	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MLT	9	783	-	-	679	702	-	-	-	-	-	-	-	-	-	-	-	-	-
ART	51	826	-	745	-	744	-	-	-	-	-	-	-	-	-	-	-	-	-
OFT	14	937	-	785	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean		981	793	754	679	723	763	654	1032	655	1140	864	1001	906	826	1060	662	781	1271
Over all percentage	142		24	30	44	36	29	50	-	50	-	14	-	8	19	-	48	26	-



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Table 2: Over all trial Performance of blackgram VBN 7 (culture VBG04-008) at Irrigated conditions.

Trials	No. of trials/ Locations (142)	Yield kg/ha																	
		VBG 04-008	VBN 3	VBN(Bg)4	ADT5	CO5	IPU 2-43	Pant U 30	TPU 4	RBU 38	Uttara	WBU -108	KU96-3	TPU	WBU -109	Pant U 31	PU 30	TU 94-2	NUL 7
Station	4	955	793	732	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MLT	9	783	-	-	679	702	-	-	-	-	-	-	-	-	-	-	-	-	-
IVT	21	1088	-	-	-	-	830	711	1040	655	1179	889	-	-	-	-	-	-	-
AVT-1	30	999	-	-	-	-	690	597	-	-	1126	856	907	906	826	1009	-	-	-
AVT-2	13	980	-	-	-	-	770	-	1024	-	-	-	1095	-	-	1110	662	781	1271
Mean	77	961	793	732	679	702	763	654	1032	655	1153	873	1001	906	826	1060	662	781	1271
Overall %			21.18	31.28	41.53	36.89	25.95	46.91	-	46.71	-	10.08	-	60.70	16.34	-	45.16	23.04	-

Table 5: Reaction of Urdbean entries against Powdery mildew (1 - 9 score), Root rot (%), Stem necrosis (%), Leaf crinkle (%), for South Zone in Kharif season.

Entry	Powdery mildew (1 - 9 score)			Root rot (%)	Stem necrosis (%)	Leaf crinkle (%)		
	Coimb.	Lam	Bangalore	Coimb.	Coimb.	Coimb.	Lam	Vamban
VBG 04-008	2	1	2	8.7	10.8	13.0	1.0	8.0
IPU 07-3	3	5	3	11.6	15.0	11.6	3.0	4.8
UH 04-04	1	4	2	17.1	14.3	11.4	1.0	-
Susceptible Check (CO 5)	1	4	4	11.4	8.6	11.4	1.0	-

Source: Annual Report of All India Coordinated Research Project on MULLaRP (Kharif season).

Table 6: Protein and minerals content of Blackgram VBN 7 (VBG04-008).

Characters	VBG04-008	VBN(Bg)4
Protein %	21.05	20.14
Crude fibre (g/100g)	5.90	4.90
Iron (mg/100 g)	3.76	3.42
Phosphorus (mg/100 g)	396.0	378.0
Calcium (mg/100 g)	38.40	36.0
Ash %	3.30	3.40

Table 7: Descriptor of Blackgram VBN 7.

Sl. No.	Characters	Descriptions
1	Name of the variety	: Blackgram VBN 7
2	Pedigree	: Vamban 3 x <i>Vigna mungo</i> var. <i>silvestris</i>
3	Year of development	: 2002
4	Year of identification	: 2011
5	Origin (Name of the Institute)	: National Pulses Research Centre Vamban - 622 303
6	Plant growth habit	: Erect upright
7	Plant habit	: Determinate
8	Stem colour	: Green with purple wash
9	Stem pubescence	: Present
10	Shape of leaf pinnae	: Ovate Lanceolate
11	Colour of the leaf	: Green
12	Leaf pubescence	: Present
13	Petiole colour	: Green with purple wash
14	Pod colour: intensity of colour of premature pods	: Uniform green
15	Pod pubescence	: Present
16	Pod colour at maturity	: Black
17	Seed colour	: Black

18	Seed lusture	:	Dull
19	Seed shape	:	Oval
20	Days to 50% flowering	:	40 days
21	Days to maturity (days)	:	70 days
22	Plant height (cm)	:	17 cm
23	Seeds per pod	:	4 - 5
24	100 seed weight (g)	:	Medium (4.7g)
25	Disease reaction	:	Resistant against MYMV, PMD and LCV

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