On-farm evaluation of yellow mosaic virus (YMV) resistant varieties of black gram for southern zone of Tamil Nadu

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ABSTRACT

Black gram is the major pulse crop cultivated in Tirunelveli district of Tamil Nadu over 21,000 ha and yellow mosaic virus of the crop is the major problem faced by the farmers which leads to major reduction in yield. An attempt was made to identify yellow mosaic virus resistant varieties suitable for this region through farmer participatory on-farm evaluation of varieties during 2018. The study revealed that lower disease incidence of 1.5 per cent was recorded in VBN 8 which was superior to other varieties and highest of 40 per cent disease incidence was recorded in farmers practicing variety VBN 4. Variety VBN 8 recorded higher yield of 8.0 q/ha which was on par with VBN 6. Higher net return of Rs 25,500/ha and benefit-cost ratio of 2.75 was recorded in VBN 8 compared to the other varieties. Farmers were satisfied with VBN 8 due to its lower incidence of yellow mosaic virus and high yielding nature. Thus VBN 8 would be a better option to the farming community for enhancing the on-farm productivity of black gram in southern zone of Tamil Nadu.

Keywords: Black gram; YMV; disease incidence; resistance; VBN 8

INTRODUCTION

Black gram (*Vigna mungo*) is one of the most important pulse crops cultivated in India. It is the cheapest source of dietary protein of 20-25 per cent. Pulses are important to low income countries where the major sources of protein are non-animal products (Ben-belhassen 2005). In Tamil Nadu, it is cultivated in an area of 3.73 lakh hectare with a production of 3.60 lakh tonne and productivity of 645 kg/ha (Anon 2017). Important reason for low productivity is biotic stresses including viruses which cause poor fertility levels of the soil. The problem is compounded by the fact that the majority of the farmers in the rainfed regions have lack of awareness about new and high yielding varieties, resource poor with low risk bearing capacity and generally do not apply recommended practices. Yellow mosaic virus is the most destructive disease during all seasons. It results in heavy crop loss from 50 to 70 per cent especially if the disease occurs in the early stages of crop growth. Black gram is subjected to attack by as many as 64 species of insect pests (Lal 1987). To manage this, generally farmers use huge quantities of pesticides indiscriminately without any proper diagnosis which results in development of resistance and resurgence of the pests as well as environment pollution. Keeping this in view, ICAR-Krishi Vigyan Kendra, Tirunelveli, Tamil Nadu identified the yellow mosaic virus resistant varieties of black gram for southern zone of Tamil Nadu.

MATERIAL and METHODS

The present study was carried out by ICAR-Krishi Vigyan Kendra, Tirunelveli, Tamil Nadu in the Surandai village of Keezhapavoor block of Tirunelveli district during the rabi season of 2018. The trial was taken up in the rainfed conditions where the yellow mosaic virus was predominant one. Randomized block design was adopted in the trial by using 4 treatments and 5 replications. The treatments included resistant varieties like VBN 8, TBG 104 and VBN 6 selected for on-farm trials with the farmers practice of VBN 4 black gram. The special features of the selected varieties are presented in Table 1. The selected progressive farmers were trained on scientific methods of cultivation as recommended by Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.

On the receipt of monsoon, the sowing was performed by the farmers on scientific guidelines. The demonstrated fields were regularly monitored and periodically observed by the scientists of the KVK. Incidence of yellow mosaic virus disease was calculated by counting the number of plants infected and total number of plants in the plot by using the formula as suggested by Banerjee and Kalloo (1987).

$$\text{Per cent pest/disease incidence} = \frac{\text{Number of plants infected in a row}}{\text{Total number of plants in a row}} \times 100$$

At the time of harvest, yield data were collected from all the treatment plots. The cost of cultivation and profit details of both the systems were collected from the farmers for working out the benefit-cost ratio. Each variety was sown in an area of 1 acre in each farmer's field and the package of practices was followed as per the Tamil Nadu Agricultural University recommendations. The data on grain yield and cost economics were recorded based on the prevailing market prices.

Table 1. Varieties selected for on-farm evaluation and their special features

Variety	Features
VBN 8	Resistant to yellow mosaic virus and leaf crinkle disease; Duration: 65-75 days; Yield: 990 kg/ha; Released by Tamil Nadu Agricultural University in 2016
TBG 104	Resistant to yellow mosaic virus; Duration: 75-80 days; Photo-insensitive; Yield: 1,700 kg/ha; Released by Regional Agricultural Research Station, Tirupati, Tamil Nadu in 2017
VBN 6	Resistant to yellow mosaic virus; Duration: 65-70 days; Yield: 890 kg/ha; Released by Tamil Nadu Agricultural University in 2011
VBN 4 (Farmers practice)	Resistant to yellow mosaic virus; Duration: 75-80 days; Yield: 790 kg/ha; Released by Tamil Nadu Agricultural University in 2003

RESULTS and DISCUSSION

The results of the on-farm trials revealed that lower incidence of yellow mosaic virus (1.5%) was recorded in VBN 8 variety which was on par with VBN 6. The highest incidence of 40 per cent was recorded in farmers practicing variety VBN 4 (Table 2). The findings of the present study are in line with the findings of Pandiyan et al (2018).

Data given in Table 3 indicate that VBN 8 variety recorded the highest yield of 8.0 q/ha followed by VBN 6 yielding 7.7 q/ha the two being at par. Farmers practicing variety VBN 4 recorded the lower yield of 5.8 q/ha. Variety VBN 8 recorded 37.93 per cent increase in yield over farmers practicing variety followed by VBN 6 which recorded 32.76 per cent increase in yield. The results are in line with the findings of Saravanakumar (2018).

The data given in Table 4 show that highest gross and net return of Rs 40,000/ha and 25,500/ha respectively were recorded in case of variety VBN 8 followed by VBN 6 with gross return of Rs 39,000/ha and net return of Rs 24,500/ha. The lowest gross return and net return were observed in local check variety VBN 4. The highest benefit-cost ratio of 2.75 was recorded in VBN 8 followed by 2.69 in VBN 6. The findings of the present study are in line with the findings of Devi et al (2018).

CONCLUSION

Based on the findings, it is concluded that yellow mosaic virus resistant variety VBN 8 recorded higher grain yield, lower incidence of yellow mosaic virus and it is on par with VBN 6. Higher net return of Rs 25,500/ha and benefit-cost ratio of 2.75 was recorded in VBN 8 compared to the other varieties. Farmers were satisfied with the performance of VBN 8 black gram variety since it performed well with high resistance to yellow mosaic virus disease. Therefore VBN 8 black gram variety is identified as a yellow mosaic virus resistant variety for southern zone of Tamil Nadu.

Table 2. Disease incidence as influenced by varieties

Variety	Per cent disease incidence
VBN 8	1.5
TBG 104	3.2
VBN 6	2.8
VBN 4 (local check)	40

Table 3. Yield and its advantage over farmers practicing variety

Parameter	VBN 8	TBG 104	VBN 6	VBN 4 (local check)
Yield (q/ha)	8.0	7.2	7.7	5.8
Per cent yield increase over farmers practicing variety	37.93	24.14	32.76	-

Table 4. Cost economics for selected black gram varieties

Parameter	VBN 8	TBG 104	VBN 6	VBN 4 (local check)
Gross cost (Rs/ha)	14,500	14,800	14,500	17,500
Gross return (Rs/ha)	40,000	36,000	39,000	29,000
Net return (Rs/ha)	25,500	21,200	24,500	11,500
B-C ratio	2.75	2.43	2.69	1.65

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