Original Research Article

Assessing the performance of latest greengram varieties under improved production packages in Thiruppur, Tamil Nadu, India

ABSTRACT

On Farm Testing (OFT) in Mungbean Yellow Mosaic Virus (MYMV) resistant and high yielding greengram varieties was conducted by Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Tirupur in farmers field during *kharif* 2020. Totally 15 farmers each with one acre were selected in three villages of Pongalur Block in Tirupur district of Tamil Nadu. Critical input *viz*., seeds of greengram varieties CO 8 and DGG 1 were distributed to the farmers and the varietal performance were assessed along with the existing variety under cultivation VBN 2. The plant physiological parameters *viz.*, plant height, number of nodules / plant and yield attributing parameters such as number of pods / plants, number of branches/plant, Mung bean Yellow Mosaic Virus (MYMV) disease incidence (%), yield (q ha^{-1}) and B:C ratio were recorded. The results revealed that, among the three varieties, Greengram CO 8 was recorded more number of pods (42) and minimum incidence of Mungbean Yellow Mosaic Virus (MYMV) disease incidence of 3.2 per cent resulting in the highest yield of 9.5 q ha^{-1} followed by DDG 1 with 34 pods/plant, MYMV disease incidence of 7.3 per cent and yield of 8.4 q ha^{-1} compared to the existing variety VBN 2, which recorded the lowest number of pods (31 Nos.), yield (7.6 q ha^{-1}) with the highest MYMV disease incidence (12.5%). The highest B:C ratio was recorded in greengram variety CO 8 (2.92) which was followed by DDG 1 (2.58). It was concluded that, farmers of Tirupur district in Tamil Nadu were satisfied with cultivation of greengram CO 8 variety due to the lowest disease incidence, higher yield and Benefit Cost Ratio.

Key Words: Greengram, Latest varieties, On Farm Testing, Yield improvement, B: C ratio.

INTRODUCTION:

"Pulses occupy a very important position in Indian Agriculture and have the ability to fix the atmospheric nitrogen and addition of organic matter to soil, which are important to maintain and restore the soil fertility soil fertility" (Kumar and Singh, 2014). "Pulses are good and cheaper source of protein, which indicate the great importance in the daily food habits.Their protein composition makes up for overcoming the deficiency of essential amino acids in cereal and millets. India is the largest producer, consumer and importer of pulses in the world. The total world acreage under pulses is about 93.18 million ha with production of 89.82 million tons and productivity of 964 kg ha^{-1}. India is the largest pulse producing country in the world in an area of 28 M ha. It ranks first in area and production with 31 per cent and 28 per cent respectively" (Jeevitha et. al., 2022). "It accounts for 33 per cent of world area and 22 per cent of the world production of pulses" (Sandhu and Dhaliwal, 2016). Greengram (*Vigna radiata*) commonly known as moong, an important pulse crop in India and about 1.5 to 2.0 Mt of moong annually produced from 4.0 million ha with an average productivity of 500 kg ha^{-1} and accounts for about 10-12 per cent of total pulse production. The total coverage under mungbean has been about 46 lakh hectares with a production of 24 lakh tonnes. More than 90 per cent of mungbean production comes from Rajasthan, Madhya Pradesh, Maharashtra, Karnataka, Bihar, Odisha, Gujarat, Andhra Pradesh and Tamil Nadu. In Tamil Nadu, it is grown on about 42.38 lakh hectares with a total production of 30.9 lakh tonnes and a productivity of 729.1 kg ha^{-1} and contributes 12% to the total pulse production in the year 2020-21. In Tirupur district, Tamil Nadu pulses is the major crop, which is cultivated in nearly 10,000 ha. Very old variety VBN 2 is predominantly grown by Tiruppur farmers and this variety is more susceptible to Yellow Vein Mosaic Virus (YMV), which leads to higher cost towards control of pest and disease and resulted in low yield and income.

Yellow mosaic disease incidence has been reported as high as 100 percent in susceptible cultivars in farmers' fields. The virus poses a major threat to greengram production globally, demanding urgent attention and effective management practices. Various management approaches have been employed to mitigate the impact of YMV. To overcome this problem, Tamil Nadu Agricultural University has released

MYMV resistant, short duration (55-60 days) greengram CO 8 variety, which is suitable for single harvest. But, most of the farmers of Tamil Nadu are using only the old variety VBN 2, which is moderately resistant to MYMV. A participatory rural appraisal study was conducted to assess the greengram varieties used by the farmers for cultivation in Thiruppur District of Tamil Nadu. The study revealed that due to non awareness of the recently released MYMV resistant greengram CO8 variety, the farmers are cultivating very old greengram variety VBN 2 which is low yielding, susceptible to Moongbean Yellow Mosaic Virus (MYMV), leaf crinkling and powdery mildew diseases. This MYMV is transmitted through the vector whitefly (*Bemisiatabaci* Genn.). For control of these vector, farmers are using pesticides indiscriminately which leads to environmental pollution and higher cost of cultivation. Therefore, it was considered to evaluate the growth and yield parameters of two selected high yielding varieties of greengram in farmer's field of Tiruppur district of Western Tamil Nadu to identify the most suitable variety for Moogbean Yellow Mosaic Virus (MYMV) resistance and obtaining higher yield and B:C ratio.

MATERIALS AND METHODS

Totally 15 numbers of On Farm Tests (OFT's) were conducted during *Kharif* 2020 at three villages in Pongalur block of Tiruppur district, Tamil Nadu. Five farmers' were randomly selected in each village in an area of 5.0 acres (Each with one acre) and sowing was taken up with two high yielding improved varieties of greengram *viz*., CO 8 released by Tamil Nadu Agricultural University and DDG 1 by University of Agricultural Science, Dharward in seven replications along with one check variety VBN 2, which is commonly cultivated by the farmers. For all the three varieties, existing farmer's cultivation practices and improved crop management techniques were adopted. The details of the cultural practices followed were given in Table1. The recommended weed control measures and irrigation were applied according to requirement of crop. The plant physiological and yield parameters like average number of nodules/plants, plant height, number of branches, number of pods/plant and yield were recorded.

Table 1. Details of greengram cultivation practices in Tirupur district, Tamil Nadu **under OFT**

Sl. No.	Cultural operation	Existing cultivation practice	Improved cultivation practice
1.	Variety	VBN 2	CO 8 and DDG 1
2.	Seed rate	30 kg ha $^{-1}$	20 kg ha^{-1}.
3.	Seed quality	Farm saved seeds	Certified seeds
4.	Seed treatment	No seed treatment	Seed treatment with Biofertilizers and *Pseudomonas florescence*
5.	Method of sowing	Broadcasting	Line sowing
6.	Weed management	Hand weeding	Integrated weed management
7.	Fertilizer application	Indiscriminate application	Integrated Nutrient Management with recommended fertilizer dose
8.	Foliar application of nutrient	No foliar application	TNAU pulse wonder @ 5 kg/ha
9.	Plant protection	Indiscriminate application	Integrated Pest management

The height of the plant was measured from the ground level to the tip of the main branch at maturity (60 days after sowing) from ten plants in each variety and the mean expressed in cm. Total number of pods in each variety were counted at maturity and the mean plant^{-1} was arrived. The technology gap, extension gap and technology index were assessed by using the formula given by Samui *et al* (2000).

Technology gap = Potential yield – yield obtained with improved practices

Extension gap = Improved practices yield– Farmers yield

Technology Gap

$$\text{Technology Index} = \frac{\text{Potential Yield}}{\text{Potential Yield}} \times 100$$

The MYMV disease incidence was recorded at 45 days after sowing. In each plot, the total numbers of healthy plants, as well as virus-infected plants were counted separately and the percentage of the infection was calculated by using the following formula.

$$\text{Total number of infested plants} = \frac{\text{Percent MYMV disease incidence}}{\text{Total number of plants}} \times 100$$

RESULTS AND DISCUSSION

The result indicated that more number of nodules were found in CO 8 variety which was significantly superior (12.8 Nos.) followed by DDG 1 (10.5 Nos.). The farmers used variety VBN 2 recorded the lowest number of nodules (6.5 Nos.)(Table 2). This might be due to decrease in P-adsorption or fixation and enhanced phosphorus availability with application of organic manures resulting in better growth and consequently exploitation of greater soil volume for modulation (Choudhary *et al.,* 2011). The maximum plant height was recorded in variety CO 8 (48.3 cm) over DDG 1 (45.6 cm) and VBN 2 (43.2 cm). The variety CO 8 produced more number of branches per plant (9.6) followed by DDG 1 (8.4) and VBN 2 (7.3). The reason may be attributed to the genetic variability and varietal difference, environmental adaptability and adoption of improved cultivation practices. Similar results were reported by Samant (2014) in greengram. The variety CO 8 recorded more number of pods/plant (42.0 Nos.) which was significantly higher over the variety DDG 1 (34.0 Nos.) and VBN 2 (30.0 Nos.). The positive effect of phosphorus application on number of pods/plants might be due to better enzymatic activities which control flowering and pod formation (Kumar and Singh, 2014).

Table 2. Performance of greengram varieties on growth parameters and yield attributes

Treatments	No. of Nodules	Plant height (cm)	No. of Branches	No. of pods/ plant	No. of grain/ pod	Disease incidence (%)	Yield (q ha^{-1})
Famers' practice VBN 2	6.5	43.2	7.3	30	11.0	12.5	7.6
CO 8	12.8	48.3	9.6	42	11.8	3.2	9.5
DDG 1	10.5	45.6	8.4	34	11.4	7.3	8.4
CD *P*< (.05)	2.32	1.64	.61	1.72	.16	1.41	.42

** Significant at 5% level of probability*

The variety CO 8 recorded the maximum number of grain/ pod (11.8 Nos.) which was significantly superior to DDG 1(11.4 Nos.) whereas, the farmers' used variety had minimum grain/pods (11.0 Nos.). The reason may be attributed towards the genetic variability and grain size.The disease incidence (%) ranged between 3.2 to 7.3 per cent in two varieties whereas, the farmers' practice recorded 12.5 per cent (Table 2). The maximum yield was recorded in greengram CO 8 (9.5 q ha^{-1}) which was significantly superior to DDG 1 (8.4 q ha^{-1}). However, the variety VBN 2 recorded the lowest yield of 7.6 q ha^{-1}. The similar result was observed by Kathiravan and Vanitha (2017) in paddy and they reported that the replacement of old varieties and farmers' practice by high yielding varieties with improved production technology increased the productivity in rice. Cultivation of groundnut variety CO 7 with improved production technology recorded 15 per cent more number of pods per plant and 17 per cent higher pod yield (Marimuthu and Kathiravan 2019). Similar findings have been observed by Anuratha *et al* (2019) in greengram.

Table 3. Yield, technology gap, extension gap and technology index of greengram varieties

Name of Variety	Yield (q/ha.)			Per cent increase	Technology Gap (q ha^{-1})	Extension gap (q/ha)	Technology index (%)
	Potential yield (q ha^{-1})	Improved practices	Farmers' Practice (VBN 2)				
CO 8	11.0	9.5	7.6	25.0	1.5	1.9	13.63
DDG 1	12.0	8.4	7.6	15.8	3.6	0.8	30.00

The technology gap ranged between 1.50 to 3.60 q ha^{-1} (Table 3). The observed technology gap was due to various constraints such as improved varieties, soil fertility, availability of low moisture content and climatic hazards *etc*. Hence, to reduce the yield gap, location specific recommendations for varieties, soil testing and timely sowing appears to be necessary. A value of 0.8 to 1.9 q ha^{-1} of extension gap was found (Table 3). There is a need to decrease this wider extension gap through field demonstration of latest techniques and imparting knowledge about improved varieties to farmers through on farm training programme. These findings were similar to the findings of Jain (2016) and Kushwah *et al* (2016). "The technology index showed the suitability of varieties for cultivation at farmer's field for getting higher yield and lower technology value indicated that the feasibility of variety adoption among the farmers is more. The technology index ranged from 13.63 to 30.00 per cent" (Table 3). Sandhu and Dhaliwal (2016).

Table 4. Yield and economics of greengram varieties

Variety	Yield (q ha^{-1})	Economics of Trials (Rs. /ha)			
		Gross cost	Gross income	Net income	B:C Ratio
Famers' practice VBN 2	7.6	24000	60800	36800	2.53
CO 8	9.5	26000	76000	50000	2.92
DDG 1	8.4	26000	67200	41200	2.58

The greengram variety CO 8 recorded the highest net income of Rs. 50000/- and Benefit Cost Ratio of 2.92 over the varieties DDG1 (Rs.41200/ and 2.58, respectively) and VBN 2 (Rs. 36800/ and 2.53, respectively) (Table 4).

CONCLUSION

The results revealed that among the three varieties, greengram CO 8 recorded the highest number of pods (42) and minimum incidence of Mungbean Yellow Mosaic Virus (MYMV) disease of 3.2 per cent resulting in the highest yield of 9.5 q ha^{-1} followed by DDG 1 with 34 pods/plant, MYMV disease incidence of 7.3 per cent and yield of 8.4 q ha^{-1} compared to the existing variety VBN 2 which recorded the lowest number of pods (30 Nos.), yield (7.6 q ha^{-1}) with the highest disease incidence (12.5%). The higher B:C ratio was recorded in greengram variety CO 8 (2.25). It was concluded that, farmers of Tirupur district in Tamil Nadu were satisfied with cultivation of greengram CO 8 variety due to the lowest MYMV disease incidence, higher yield and BC ratio.

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