Response of Green Gram to the Improved Production Technologies through Frontline Demonstration in Erode District of Tamilnadu

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ABSTRACT

*Mung bean (*Vigna radiata L*) or green gram is one of the important pulse crop cultivated over 2000 ha area in Erode district of TamilNadu. A study was conducted in the bargur hills of Western Ghats, Erode district to increase the yield of green gram during Rabi 2019 and Kharif 2020. Attempts were made to reduce the yield gap of mung bean by adopting integrated crop management practices through cluster frontline demonstrations. The integrated crop management practices comprised of introduction of high yielding green gram variety, seed treatment with rhizobium, foliar application of micronutrients, integrated nutrient and plant protection measures were demonstrated. The results showed that the average higher grain yield of 800 kg/ha recorded in demonstration plots compared to 683 kg/ha in farmers practice with a yield advantage of 17.235 per cent over the farmer practices. The average extension gap, technology gap and technology index were 117 kg / ha, 74 kg/ ha, and 8.46 percent respectively The higher net return of Rs. 25145.00 / ha was recorded with benefit cost ratio of 2.11 which was significantly superior than the existing farmers practice. Considering the above facts, Frontline demonstrations were carried out in a systematic and scientific manner on farmer's field to show the worth of a new variety and the potentialities of improved production management technologies in mung bean for further adoption.*

Key words: *Cost economics; Frontline demonstration; Green gram; Improved production technologies; Yield gap;*

Pulses hold an important place in human nutrition on account of their rich nutritional contribution to diets, particularly for proteins, essential minerals and vitamins, and dietary fiber. They also form a staple part of diets along with cereals as an essential accompaniment. They are of significance in South East Asian dietaries where people are vegetarians or do not have an access to animal sources of proteins due to economic reasons. The requirements of pulses is expected to rise further mainly due to increasing population and preference for pulses as the cheapest source of dietary protein. It contains 24.5 per cent protein and 59.9 per cent carbohydrate. It also contains 75 mg calcium, 8.5 mg iron and 49 mg R-carotene per 100 g of split dual (*Bhowaland and Bhowmik, 2014*).

Green gram (*Vigna radiata L*) belongs to the family leguminoceae and sub family papilionaceae, is being grown as one of the principal crop since ages in our state as well as in the country. The annual world production area of mung bean is about 5.5 million hectare. India is the primary green gram producer and contributes about 75 per cent of the world's production (*Taunk et al., 2012*). It is highly nutritious pulse crop having nearly 24 to 25 per cent protein in seed. It is commonly grown in rainy and summer seasons in India. Despite of this features, the productivity of crop is below the average owing to several inherent soil related constraints such as low organic matter and poor soil fertility. Hence, it requires sincere efforts to enhance its productivity. The climatic change and global warming has deleterious effects on crop production in terms of period of maturity and yield (*Singh and Sharma, 2014*). Mung bean is the only pulse crop which can be grown throughout the year in three cropping seasons (*Bhowaland and Bhowmik, 2014*). The productivity gap analysis revealed that the national average yield of green gram is 413 kg ha^{-1} as

against 570 kg ha^{-1} in TamilNadu. This indicates that there is a wide scope for increasing the productivity of green gram by proper management practice

Adoption levels for several components of the improved technology of the crop were low emphasizing the need for better dissemination (*Kiresur et al., 2001*). The productivity of the crop could be increased by adopting the improved production technologies, management practices and suitable varieties (*Ranawat et al., 2011*). Hence to overcome the problems of the farmers, frontline demonstrations were laid out to demonstrate the impact of improved production technologies and its response on green gram crop yield under the real farm situations over the locally cultivated varieties in the farmers' holdings of Erode District of TamilNadu.

METHODOLOGY

The present study was carried out during Rabi 2019 and Kharif 2020 in Bargur hills of Erode district. Frontline demonstrations on improved production technologies in green gram were demonstrated in the farmers' field of selected villages. A total of 50 demonstrations, covering 25 demonstrations in each year were conducted with an area of 0.4 ha and adjacent to the farmers' fields in which the crop was cultivated with farmer's practice/variety. The selected progressive farmers were trained on all scientific green gram cultivation aspects before starting of frontline demonstrations. The improved variety of mung bean (Co - 8) was selected for demonstration. Co 8 green gram variety is resistant to yellow mosaic and moderately resistant to stem necrosis, root rot, aphids and stem fly. *Thimmegowda (1983)* found in green gram (kharif) raised in red sandy loam soils in Bangalore. The detailed of interventions demonstrated under frontline demonstration were presented in Table 1.

Table 1. Scientific Interventions Demonstrated in Frontline Demonstrations

Scientific interventions	Recommendations
High yielding variety	CO-8
Seed rate	20 kg / ha
Seed treatment	Seed treatment with rhizobium @ 600 gram / ha seed
Plant protection	As per the recommendation of TamilNadu Agricultural University
Micronutrient mgt. management	Foliar application of Pulse wonder @ 5 kg / ha

At the time of harvest yield data were collected from both the demonstrations and farmers practice. Cost of cultivation, net income and benefit cost ratio were worked out. To study the impact of frontline demonstrations, data from FLD and farmers practices were analyzed. Yield gap refers to the difference between the potential yield and actual farm yield. The extension gap, technology gap and technology index were calculated using the formula as suggested by *Samui et al. (2000).*

$$\text{Ext. Gap } \left(\frac{q}{ha}\right) = DY\left(\frac{q}{ha}\right) - LY\left(\frac{q}{ha}\right)$$

$$\text{Tech. Gap } \left(\frac{q}{ha}\right) = PY\left(\frac{q}{ha}\right) - DY\left(\frac{q}{ha}\right)$$

$$\text{Tech. Index } (\%) = \frac{PY\left(\frac{q}{ha}\right) - DY\left(\frac{q}{ha}\right)}{PY\left(\frac{q}{ha}\right)}$$

Where,

DY = Demonstration Yield

LY = Local Check Yield

PY = Potential Yield of variety

RESULTS AND DISCUSSION

The results of the demonstrations and farmers practices were presented in Table 2.

Table 2. Yield of green gram as influenced by improved production technologies

Season	Demo. yield	Farmers Practice	% yield increase
Rabi 2019	795	660	20.45
Kharif 2020	805	706	14.02
Total	1600	1366	34.47
Average	800	683	17.235

The average yield of green gram under demonstration was 800 kg / ha (Table 2) was higher than the average yield of farmers practice (683 kg/ha). The integrated crop management practices showed that 17.235 percent yield increase over the farmers practice. These results indicated that the frontline demonstrations gave good impact over the farming community in Erode district as they were motivated by the improved production technologies applied in the demonstration plots. The findings of the present study are in line with *Singh et al, (2018), Rai et al, (2015)* and *Jyothi Swaroopa et al, (2016).*

Technology gap and extension gap : The technology gap shows the gap between the potential yields of the

crop over demonstrated yield. The technology gap was recorded as 74 kg / ha (Table 3). The extension gap shows the gap between the demonstration yield and local yield and it was 117 kg/ha. The observed extension gap and technology gap may be attributed due to dissimilarities in soil fertility levels, pest and disease incidence, improper usage of manures and fertilizers in this region (*Mukherjee 2003*). More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend. The new technologies will eventually lead to discontinue the old technologies and to adoption of new technologies by the farmers.

Table 3. Yield, Extension gap, Technology gap and Technology index of the demonstration

Year	PY	DY	FP	EG	TG	TI
2019	874.00	795.00	660.00	135.00	79.00	9.04
2020	874.00	805.00	706.00	99.00	69.00	7.89
Av.	874.00	805.00	714.50	117.00	74.00	8.46

PY=Potential Yield (Kg/Ha); DY=Demo Yield (Kg/Ha); FP=Farmers Practice Yield (Kg/Ha); EG=Extension gap (Kg/Ha); TG=Technology gap (Kg/Ha); Technology Index (%);

Technology Index : Technology index shows the feasibility of the variety and improved production technologies in the farmers' field. The lower the value of the technology index more is the feasibility. Table 3 revealed that the technology index value was 8.46 per cent. The results are the present study is in line with *Raghav et al. (2021), Singh et al. (2019)* and *Rai et al, (2015).*

Table 4. Cost of cultivation, gross return, net return and benefit cost ratio influenced by improved crop management practices

Year	Gross cost (Rs/ha)		Gross return (Rs/ha)		Net return (Ra/ha)		Benefit cost ratio (BCR)	
	Demo	check	Demo	check	Demo	check	Demo	check
2019	21500	23800	43341	38512	21841	14712	2.02	1.62
2020	23750	24200	52200	44508	28450	20308	2.20	1.84
Total	45250	48000	95541	83020	50291	35020	4.22	3.46
Average	22625	24000	47770.5	41510	25145.5	17510	2.11	1.73

Economics : The economic feasibility of the scientific adoption of technologies over farmers practice was calculated depending on the prevailing prices of inputs and output costs. It was found that the average cost of cultivation under improved crop management practices was Rs. 22,625.00 / ha (Table 4) and an average production cost of Rs. 24000.00 /ha observed in farmers practice. The demonstrated field recorded the higher mean gross return of Rs.47770.50/ha and the net return of Rs. 25145.50/ha with the high benefit cost ratio of 2.11. The economic parameters like gross cost, gross return and net return was observed as high in the demonstration units than the farmers practice. These findings are in line with the findings of *Saravanakumar (2020), Sreelakkshmi et al. (2012) and Hiremath* and *Nagaraju (2009).* These results are clearly indicated that the adoption of improved package of practices was enhancing the mung bean production and economic returns in Erode district.

CONCLUSION

Based on the findings, it is concluded that the scientific adoption of integrated crop management technologies along with new green gram variety Co 8 performed superior than the existing farmers practice in all the demonstrations. Yield potential of the green gram variety is increased 17.235 per cent over farmers practice. It is also suggest that conducting large scale adoption demonstrations and ensuring the critical inputs in time for adoption of technologies play a critical role in enhancing green gram production. The findings also concluded that the adoption of integrated crop management practices along with new variety paved the way for improving the productivity of green gram per unit area.

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