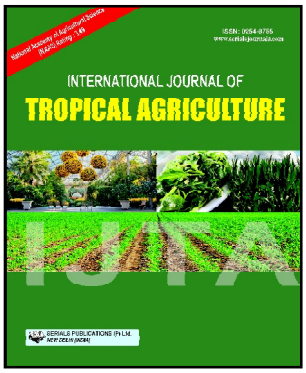

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Yield Gap Analysis of Mung Bean through Frontline Demonstration in Erode District of Tamilnadu

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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. Attempts were made to reduce the yield gap of mung bean by adopting integrated crop management practices. The integrated crop management practices comprised of introduction of high yielding variety, seed treatment, integrated nutrient and plant protection measures were demonstrated. The results showed that the average higher grain yield of 805 kg/ha recorded in demonstration plots compared to 715 kg/ha in farmers practice with a yield advantage of 12.68 per cent over the farmer practices. The average extension gap, technology gap and technology index were 90.50 kg / ha, 68 kg/ ha, and 7.79 percent respectively. The integrated crop management practices gave higher benefit cost ratio of 2.16 compared to farmer practices. 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.

Keywords: mung bean, Frontline demonstration, yield gap, cost economics

INTRODUCTION

Mung bean (*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% of the world's production (Taunk *et al.,* 2012). It is highly nutritious pulse crop having nearly 24 to 25% protein in seed. It is commonly grown in rainy and summer seasons in India.

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% protein and 59.9% carbohydrate. It also contains 75 mg calcium, 8.5 mg iron and 49 mg R-carotene per 100 g of split dhal (Bhowaland and Bhowmik, 2014). 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).

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 yield gap reduction and improve the production potential of mung bean variety with improved package of practices under the real farm situations over the locally cultivated varieties in the farmers' holdings of Erode District of Tamil Nadu.

MATERIALS AND METHODS

Frontline demonstrations on integrated crop management in mung bean were conducted by Krishi Vigyan Kendra during Kharif 2017 and 2018 in the farmers' field of selected villages. Each year 25 demonstrations 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 mung bean cultivation aspects before starting of frontline demonstrations. The improved variety of mung bean (CO - 8) was selected for demonstration. The detailed of scientific interventions demonstrated under frontline demonstration were presented in Table 1. The seeds were treated with bio-fertilizers and then taken for sowing. Optimum plant populations were maintained in the demonstrations. The demonstrated fields were regularly monitored and periodically observed by the scientists of KVK.

Table 1
Scientific Interventions Demonstrated in Frontline Demonstrations

Sl. No	*Scientific interventions*	*Recommendations*
1.	High yielding suitable variety	CO -8
2.	Seed rate	8 kg / ha
3.	Seed treatment	Seed treatment with rhizobium @ 600 gram / ha seed
4.	Plant protection	As per the requirement
5.	Micronutrient management	Foliar application of Pulse wonder @ 5 kg / ha

Pulse wonder is a combination of micronutrients developed by Tamil Nadu Agricultural University, Coimbatore, TamilNadu which was recommended to spray at the time of flowering and pod initiation stage.

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. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al.* (2000).

$$Extension\ gap\left(\frac{qtl}{ha}\right) = DY(Qtl/Ha) - LY(Qtl/Ha)$$

$$Technology\ gap\left(\frac{qtl}{ha}\right) = PY(Qtl/Ha) - DY(Qtl/Ha)$$

$$Technology\ Index(\%) = \frac{PY(Qtl/Ha) - DY(Qtl/Ha)}{PY(Qtl/Ha)} \times 100$$

Where,

DY = Demonstration Yield

LY = local Check Yield

PY = Potential Yield of variety

RESULTS AND DISCUSSIONS

The average yield of mung bean under demonstration was 805 kg / ha (Table 2) was higher than the average yield of farmers practice (715 kg/ ha). The integrated crop management practices showed that 12.68 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 Rai *et al*, (2015) and Jyothi Swaroopa *et al*, (2016).

Table 2
Yield of mung bean as influenced by ICM Practices

Year	*Demo yield*	*Farmers Practice*	*Percent yield increase*
2017	803	706	13.74
2018	807	723	11.62
Average	805	715	12.68

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 68 kg / ha (Table 3). The extension gap shows the gap between the demonstration yield and local yield and it was 90.50 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	*Potential Yield (Kg/Ha)*	*Demo Yield (Kg/Ha)*	*Farmers Practice Yield (Kg/Ha)*	*Extension gap (Kg/Ha)*	*Technology gap (Kg/Ha)*	*Technology Index (%)*
2017	873.00	803.00	706.00	97.00	70.00	8.02
2018	873.00	807.00	723.00	84.00	66.00	7.56
Average	873.00	805.00	714.50	90.50	68.00	7.79

Technology Index

Technology index shows the feasibility of the variety at the farmers' field. The lower the value of the technology index more is the feasibility. Table 3 revealed that the technology index value was 7.79 percent. The findings of the present study are in line with the findings of Rai *et al*, (2015).

Economics

It was found that the average cost of cultivation under improved crop management practices was Rs. 21550.00 / ha (Table 4) and an average cost of Rs. 21934.00 /ha in farmers practice. The demonstrated field recorded the higher mean gross return of Rs.46554.00/ha and the net return of Rs. 24994.00/ ha with the high benefit cost ratio of 2.16. These findings are in line with the findings of Hiremath and Nagaraju (2009) and Sreelakkshmi *et al.* (2012). 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.

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 (Ra/ha)*		*Net Return (Ra/ha)*		*BCR*	
	Demo	*check*	*Demo*	*check*	*Demo*	*check*	*Demo*	*check*
2017	23750	24200	52200	44508	28450	20308	2.20	1.84
2018	19350	19668	40888	36638	21538	16970	2.12	1.87
Average	**21550**	**21934**	**46544**	**40573**	**24994**	**18639**	**2.16**	**1.85**

CONCLUSION

There was a 12.68 percent yield increase was noticed over farmers practice in the demonstration plots. Thus it can be concluded that the demonstrations of high yielding mung bean variety along with integrated crop management practices reduces the yield gap and enhances the productivity of mung bean and motivate the other farmers of the district to adopt the improved / recommended practices.

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