Productivity enhancement in green gram through frontline demonstrations in Erode district of Tamil Nadu

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ABSTRACT

Green gram (*Vigna radiata* L) is one of the most important pulse crops cultivated in Erode district of Tamil Nadu. However the productivity of green gram in the district is quite low. Attempts were made to improve the productivity and to increase the area under the crop by adopting integrated crop management practices. The integrated crop management practices comprised introduction of high yielding variety, seed treatment, integrated nutrient and plant protection measures. The results showed higher grain yield of 689 kg/ha compared to 574.5 kg/ha in farmers' practice with an yield advantage of 19.9 per cent over the farmers' practice. The average extension gap, technology gap and technology index were 114 kg/ha, 162 kg/ha and 19.03 per cent respectively. The integrated crop management practices gave higher benefit-cost ratio of 2.2 compared to farmers' practice. Considering the above facts FLDs were carried out in a systematic and scientific manner on farmers' fields to show the worth of new variety and the potentialities of improved production management technologies in green gram for further adoption.

Keywords: Green gram; frontline demonstrations; integrated crop management

INTRODUCTION

India is the largest producer and consumer of pulses in the world. Pulses are part of the daily diet of many vegetarians around the world. Pulses are rich in protein and are an excellent source of dietary fibre, poly-unsaturated fatty acids and range of micronutrients. India accounts for 33 per cent of the world's area and 22 per cent of the production of pulses (Reddy 2004).

Among the pulse crops green gram is an important pulse crop cultivated in India. It maintains soil fertility through biological nitrogen fixation in soil and thus plays a vital role in sustainable agriculture.

Green gram is cultivated mostly on the marginal lands under rainfed situations. The productivity of green gram is very low (6.91 q/ha) in Erode district of Tamil Nadu as compared to the yield potential of the crop. One of the important reasons for low productivity is poor fertility level of the soil. The problem is compounded by the fact that the majority of the farmers in the rainfed regions lack awareness on new and high yielding varieties, are resource-poor with low risk bearing capacity and generally do not apply recommended practices.

Hence to overcome these problems frontline demonstrations were laid out to demonstrate the production potential of new green gram variety with improved package of practices in the farmers' holdings of Erode district of Tamil Nadu.

MATERIAL and METHODS

Frontline demonstrations (FLDs) on integrated crop management in green gram were laid out by Krishi Vigyan Kendra during Kharif 2015-16 in the farmers' fields of selected villages. Each demonstration was conducted in an area of 0.4 ha adjacent to the farmers' fields in which the crop was cultivated with farmers' practice/variety. Scientific interventions under frontline demonstrations were taken as mentioned in Table 1. The selected progressive farmers were trained on all scientific green gram cultivation aspects before starting

of frontline demonstrations. The demonstrated fields were regularly monitored and periodically observed by the scientists of KVK. At the time of harvest yield data were collected from both the demonstrations as well as farmers' practice. Cost of cultivation, net income and benefit-cost ratio were worked out. To study the impact of frontline demonstrations data from FLDs and farmers' practice were analyzed. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui et al (2000).

Extension gap (q/ha)= Demonstration yield (q/ha) – Local check yield (q/ha)

Technology gap (q/ha)= Potential yield of variety (q/ha) – Demonstration yield (q/ha)

$$\text{Technology index (\%)} = \frac{\text{Potential yield of variety (q/ha)} - \text{Demonstration yield (q/ha)}}{\text{Potential yield of variety (q/ha)}} \times 100$$

RESULTS and DISCUSSION

Results indicated that variety CO-8 with integrated crop management practices had higher plant height (44.7 cm), number of pods/plant (30), number of seeds/pod (9.1) and the grain yield (689 kg/ha) (Table 2). The per cent increase in yield of demonstration plots over farmers' practice was 19.9. The findings of the present studies are in line with those of Hiremath et al (2007), Dhaka et al (2010) and Rai et al (2016). From these results it is evident that the performance of improved variety along with improved practices was found better than the local check under local conditions.

Yield of frontline demonstration trials and potential yield of the crop were compared to estimate the yield gap and it was categorized into extension gap, technology gap and technology index. The extension gap showed the gap between the demonstration and local yield and it was 114 kg/ha (Table 3). The technology gap showed the gap between the potential yield of the crop over demonstrated yield and it was 162 kg/ha.

Table 1. Intervention points against low yield of green gram and recommended improved practices

Intervention point	Recommended improved practice
High yielding variety	CO-8
Seed rate	8 kg/ha
Seed treatment	Treatment of the seeds with carbendazim @ 2 g/kg seed or *Pseudomonas fluorescens* @ 10 g/kg seed followed by 600 g *Rhizobium* culture
Spacing	30 x 10 cm
Manures and fertilizers	12.5 tons FYM, 12.5:25:12.5:10 kg NPKS/ha
Weeding	Pre-emergence application of pendimethalin @ 2.5 l/ha followed by one hand weeding at 25 days after sowing
Irrigation	Critical stages: flowering and pod initiation
Foliar application of micronutrients	Foliar application of Pulse Wonder @ 5.0 kg/ha at the time of primordial initiation and pod filling stages

Table 2. Effect of frontline demonstrations on yield parameters and yield of green gram

Parameter	Farmers' practice	Recommended/improved practices
Plant height (cm)	37.8	44.7
Number of pods/plant	27	30
Number of seeds/pod	7.2	9.1
Yield (kg/ha)	574.5	689.0
Per cent increase over farmers' practice	-	19.9

The observed extension and technology gap may be attributed to dissimilarities in soil fertility levels, pest and disease incidence and improper usage of manures and fertilizers in the region. Hence to narrow down the yield gaps location specific technologies need to be adopted. Technology index shows the feasibility of the variety at the farmers' field. The lower the value of the technology index more is the feasibility. The technology index value was 19.03 per cent.

The findings are in line with the findings of Dhaka et al (2010), Hiremath and Nagaraju (2009) and Rai et al (2016).

The economic feasibility of improved practices over farmers' practice was calculated depending upon the prevailing prices of input and output cost (Table 4). It was found that the cost of production of green gram under improved practices was with an average of Rs 20020/ha and an average of Rs 20210/ha in farmers' practice.

Economic analysis of yield performance revealed that frontline demonstrations recorded the higher gross return of Rs 44264/ha and net return of Rs 24244/ha with the benefit-cost ratio of 2.2 over local checks.

Table 3. Yield, extension gap, technology gap and technology index of the demonstrations

Variable	Yield (kg/ha)	Extension gap (kg/ha)	Technology gap (kg/ha)	Technology index (%)
Farmers' practice	575	-	-	-
Improved practices	689	114	162	19.03
Potential yield	851	-	-	-

Table 4. Economics of frontline demonstrations on green gram

Parameter	Farmers' practice	Recommended/ improved practices
Gross cost (Rs/ha)	20210	20020
Gross return (Rs/ha)	36791	44264
Net return (Rs/ha)	16581	24244
Benefit-cost ratio	1.8	2.2

The results are in line with the findings of Sharma (2003) and Sreelakshmi et al (2012). The results clearly indicate that the combination of high yielding varieties with adoption of improved practices enhances the green gram production and economic gain of the farming community. Hence improved production technologies in green gram have the broader scope for increasing the productivity per unit area.

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