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# Cluster front line demonstration in green gram variety CO 8 at Nagapattinam district of Tamil Nadu

**Anuratha A, R Ravi and Selvi J**

**Abstract**
The present study was conducted by KVK, Nagapattinam during 2014-15 and 2015-16 in the Rice fallow season with fifty frontline demonstrations in Ponveli, Neduvasal, Vaanathirajapuram, Kokkur Villages of Nagapattinam district. The results of demonstrations showed that farmers could increase the green gram productivity notably by switching over to improved variety and adoption of improved production technology. From the front line demonstrations, it was observed that the improved Green gram variety CO 8 recorded a mean yield of the higher yield (5.38 q/ha) compared to the farmers' practices variety (4.33 q/ha). The mean increase in the demonstration yield over farmer's practices was 26.52 per cent. The average technology gap and the technology index values were 3.63 q/ha and 1.05 q/ha, respectively. The decline in overall yield and area under cultivation of green gram in Nagapattinam district from the year 2010 to 2016 was due to the high incidence of yellow vein mosaic (YVM) disease. The increment in yield of green gram crop under front line demonstrations was due to spreading of improved and latest technology *viz.,* YVM resistance variety, seed treatment with bio-agents, recommended seed rate and plant protection measure**.** In spite of increase in yield, technological gap, extension gap and technology index existed. The improved technology gave higher gross return, net return with higher benefit/cost ratio than farmers' practices.

**Keywords:** Green gram CO 8, YVM resistance variety, Technology index, Improved and latest technology

## Introduction

Pulses have great importance in Indian agriculture as they are rich source of protein (17 to 25 per cent) as compared to that of cereals (6 to 10 per cent), their ability to fix atmospheric nitrogen and improve the soil fertility. Among pulses, green gram is one of the most important crop. Protein malnutrition is prevalent among men, women and children in India. Pulses contribute 11 per cent of the total intake of proteins in India (Reddy, 2010) [8]. In India, frequency of pulses consumption is much higher than any other source of protein, which indicates the importance of pulses in their daily food habits. Keeping the cheapest source of protein, it is important to increase pulses production to increase balanced diet among the socially and economically backward classes. The cultivation of green gram in rice fallow season is the special feature of Nagapattinam district, in which paddy is the major rabi crop and green gram covering in an area of 45,000 ha is grown mainly in paddy fallows during rabi season immediately after the harvest of the paddy crop. These soils are usually highly fertile. Instead of leaving the fields fallow during the rabi season, farmers utilize the residual moisture in the soil to grow green gram. Among the rabi crops, green gram, reigning poor man's crop over the centuries and has potential to sustain food and nutritional security of the small and marginal farmers because of its short duration, faster growth and high nutritive values.

But the yield levels are much lower than the normal season. Method of sowing was by broadcast the seeds 7-10 days before harvest rice. Field was at waxy condition. The participatory rural appraisal study in the block reveals that the non availability of released variety suited to rabi season, farmers were cultivating the local variety of green gram which is low yielding, susceptible to mung bean Yellow Mosaic Virus (YMV), leaf crinkling and powdery mildew diseases. For control of these pests and diseases farmers were using pesticides indiscriminately which has led to increased cost of cultivation. Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential of green gram and these are needed to bead dressed. Crop growth and yield are limited through poor plant nutrition and uncertain water availability during the growth cycle. Inappropriate management may further reduce the fertility of soil (Rabbinge, 1995) [9]. The main objective of front line demonstrations is to demonstrate newly released crop production technologies and its management practices in the farmers' field under different farming situations and at different agro climatic regions. These demonstrations are carried out under the supervision of agricultural scientists. The newly and innovative technology having higher production potential under the specific cropping system can be popularized through FLD programme. The present study has been undertaken to evaluate the difference between demonstrated technologies *vis-a-vis* practices followed by the local farmers in green gram crop.

## Methodology

The present study was carried out at the Krishi Vigyan Kendra, Nagapattinam during rice fallow season in the farmers' fields during 2014-15, 2015 - 16. All 60 front line demonstrations in 24 ha area were conducted in Ponveli, Neduvasal, Vaanathirajapuram, Kokkur Villages of Nagapattinam district. High yielding YMV resistant variety Green gram CO 8 was taken in the experimentation. The crop was harvested at perfect maturity stage with suitable methods. Seed treatment and soil application of Bio control agents *Pseudomonas fluorescens*. @ 10 g/ kg of seed and 2.5 kg/ha was done. Spraying of TNUA Pulse wonder @ 5 kg/ha was done at flowering stage. Optimum plant population was maintained in the demonstrations. In general, soils of the area under study were sandy clay loam with medium to low fertility status. In demonstration plots, critical inputs in the form of quality seed, bio control agents for seed treatment and soil application, TNAU pulse wonder, Pheromone trap and yellow sticky trap were provided by KVK (Table 1).

**Table 1:** Technologies demonstrated in cluster front line demonstration programme for Green gram

| Sl. No. | Specific technology demonstrated | Recommendation/ha | Observations taken | Results | Remarks/feed-back |
|---|---|---|---|---|---|
| 1. | High yielding variety Green gram CO 8 | 20 kg | YMV incidence | 0.0 % | The field was free from YMV |
| 2. | Seed treatment with Imidacloprid | 5 ml/kg of seed treatment | YMV incidence | 0.0 % | The field was free from YMV |
| 3. | Spraying of TNAU Pulse wonder | 5 kg | No. of pods yield | 38 Nos. of pods/plant | More flowering and more pod setting |
| 4. | Yellow sticky trap | 12 Nos | YMV incidence | 0.0 % | The field was free from YMV |
| 5. | Pheromone trap | 12 Nos | Pod borer incidence | 0.0 % | The field was free from pod borer incidence |
| 6. | Application of *Pseudomonos* | 10 g/ kg of seed treatment and 2.5 kg soil application (Basal and top dressing) | Root rot incidence | 0.0 % | No root rot incidence and optimum population was obtained |

The yield data were collected from both the demonstration and farmers practice by random crop cutting method. Qualitative data was converted into quantative form and expressed in terms of per cent increase in yield. (Narasimha rao *et al.*, 2007) [4].

For the study, technology gap, extension gap and technology index were calculated as suggested by Samui *et al.* (2000) [9].

**Technology gap =** Potential yield - Demonstration yield

**Extension gap =** Demonstration yield - Farmers' yield

**Technology index (%) =** (Technology gap/Potential yield) x 100

**Yield gap - I (%) =** (Potential yield - Demonstration yield)/ Potential yield x 100

**Yield gap - II (%) =** (Demo yield - Check yield) /Demo yield x100

## Results and Discussion

The major differences were observed between demonstration package and farmer's practices are regarding recommended varieties, seed treatment, time of sowing and plant protection measures. Table 1 shows that under the demonstrated plot only recommended varieties and bio-agents were given to farmer by the KVK and all the other package and practices were timely performed by the farmer itself under the supervision of KVK scientist.

Under farmers' practice, they generally sow seed of green gram varieties of local varieties at higher seed rate without treatment. Both these varieties grow by farmers found susceptible to yellow vein mosaic disease. As a result, the farmers selected under FLD programme on green gram were provided with the seed of YVM resistance green gram variety CO 8. It is also observed that under farmer situation, normally sowing of green gram is earlier to escape from water shortage for irrigation, thus leading to reduction in yield. Regarding the foliar application of nutrient, under demonstration, TNAU pulse wonder was applied at the time of flowering to enhance the pod formation and reduce the flowering whereas, under farmers' practice, foliar application was not adopted. Similar findings have also been observed in black gram by Veeramani *et al.*, (2017) [10]

From the demonstration it revealed that, the integrated crop management practice in green gram recorded 26.52 per cent increase in the yield as compared to the farmers practice (4.33 q/ha) as against 5.38 q/ha in ICM practice, however, average highest yield (5.5 q/ha) were recorded during 2013-14.This may be attributed to sufficient and more than average rainfall distributed fairly during the pod setting to physiological maturity stage, better utilization of applied nutrients (Poonia and Pithia, 2011) [5]. The higher yield of black gram under improved technology was due to use of latest high yielding varieties, integrated nutrient management and integrated pest management ( Raj *et al*., 2017) [7] .

The results indicated that the front line demonstrations gave good impact over the farming community of Nagapattinam district as they were motivated by the new agricultural technologies applied in the FLD plots (Table 1).

**Table 2:** Impact of improved production technology on productivity of Green gram

| Year | No. of Demo | Area (ha) | Yield(q/ha) | | | | % increase in yield over local check |
|---|---|---|---|---|---|---|---|
| | | | Improved practices | | | | |
| | | | Maximum | Minimum | Average | Local check | |
| 2014-15 | 10 | 4 | 5.8 | 5.2 | 5.5 | 4.0 | 37.5 |
| 2015-16 | 40 | 20 | 6.65 | 4.40 | 5.25 | 4.65 | 15.53 |
| Total | 50 | 24 | 12.45 | 9.6 | 10.75 | 8.65 | 53.03 |
| Average | 25 | 12 | 6.23 | 4.80 | 5.38 | 4.33 | 26.52 |

**Technology gap**

The technology gap means the differences between potential yield and yield of demonstration plot. The technology gap of demonstration plots were 3.50, and 3.75 q/ha during 2014-15 and 2015-16 (Table 3), respectively. On an average technology gap under three year FLD programmes was 3.63 q/ha. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions (Mukherjee, 2003) [3].

**Extension gap**

Extension gap means the differences between demonstration plot yield and farmers yield. Extension gap of 1.5 and 0.6 q/ha was noticed during 2014-15 and 2015-16 (Table 3), respectively. On an average extension gap under two FLD programmes was 1.05 q/ha. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies. 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 adopt new technologies by the farmers.

**Technology index**

The technology index shows the feasibility of the evolved technology at the farmers' fields, as lower the Value of technology index more is the feasibility of the technology (Jeengar *et al.*, 2006) [1]. The technology index varied from 38.8 to 41.6 per cent (Table 3). On an average technology index was observed 40.4 per cent during the two years of FLD programmes.

**Table 3:** Indication of potential yield, demonstration yield, farmers yield, technological gap, extension gap and technology index

| SI. No | Potential yield ($q\ ha^{-1}$) | Demonstration yield ($q\ ha^{-1}$) | Farmers yield ($q\ ha^{-1}$) | Technological gap ($q\ ha^{-1}$) | Extension Gap ($q\ ha^{-1}$) | Technology index |
|---|---|---|---|---|---|---|
| 1. | 9.00 | 5.50 | 4.00 | 3.50 | 1.50 | 38.8 |
| 2. | 9.00 | 5.25 | 4.65 | 3.75 | 0.60 | 41.6 |
| Average | 9.00 | 5.38 | 4.33 | 3.63 | 1.05 | 40.2 |

**Economic return**

The input and output prices of commodities prevailed during the demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit/cost ratio. Data in table 4 reveals that the cost involved in the adoption of improved technology in green gram ICM varied and was more profitable. The cultivation of green gram under improved technologies gave higher net return of Rs. 8000 and 9610 per ha respectively, as compared to farmers practices (Rs. 5200 and 8950 per ha 2014-15 and 2015-16 respectively). An average net return and B:C of demonstration field is 14958 Rs/ha and 2.68 respectively as compared to farmers practice (Rs 10288 per ha and 2.37). The benefit cost ratio of ICM of green gram under improved cultivation practices higher than farmer's practices in all the years and this may be due to higher yield obtained under improved technologies compared to local check (farmer's practice). This finding is in corroboration with the findings of Mokidue *et al.* (2011) [2].

**Table 4:** Economics of improved techonologies and farmers practice in green

| Year | Total cost of cultivation ($Rs.ha^{-1}$) | | Gross Returns ($Rs.ha^{-1}$) | | Net Returns ($Rs.ha^{-1}$) | | B:C ratio | |
|---|---|---|---|---|---|---|---|---|
| | Demo | Farmers practice | Demo | Farmers practice | Demo | Farmers practice | Demo | Farmers practice |
| 2014-15 | 8000 | 5200 | 19200 | 10800 | 11200 | 5600 | 2.4 | 2.07 |
| 2015-16 | 9610 | 8950 | 28325 | 23925 | 18715 | 14975 | 2.95 | 2.67 |
| Total | 17610 | 14150 | 47525 | 34725 | 29915 | 20575 | 5.35 | 4.74 |
| Average | 8805 | 7075 | 23763 | 17363 | 14958 | 10288 | 2.68 | 2.37 |

The per cent Yellow Mosaic Virus Disease (< 6 per cent), pod borer (< 6 per cent), *Spodoptera litura* (6-10 per cent) and root rot (< 9 per cent) incidence was less in demonstration plots when compared to farmers' practice where in per cent Yellow Mosaic Virus disease, pod borer, *Spodoptera litura* and root rot incidence was 6-20, 6-30, 15- 30 and 13-15 per cent respectively (Table 5). The lower incidence of diseases and insect pests are due to inbuilt resistance of CO 8 and thorough training, constant visit and monitoring and demonstrating the integrated pest management (IPM) strategies in the implemented farmer's fields by the scientists.

**Table 5:** Effect of IPM practices on pest and disease incidence in black gram (Average of two years)

| Sl.No | Parameter | Demonstration plot (per cent) | Farmers practice plot (per cent) |
|---|---|---|---|
| 1. | Yellow mosaic virus disease (YMV)& Sucking pest | < 6 | 6 -20 |
| 2. | Pod borer | < 6 | 6-30 |
| 3. | *Spodoptera litura* | 6-10 | 15-30 |
| 4. | Root rot | < 9 | 13-15 |

**Reasons for low yield of green gram at farmers' fields**

Optimum sowing time was not followed due to non availability of quality seed. More than 90 per cent of the farmers had been sowing seed as improper seed rate method due to which the plant population was sometimes more 2-3 times more than the recommended one. Farmers were cultivating the local variety of green gram, which is low yielding, susceptible to mung bean Yellow Mosaic Virus (YMV), leaf crinkling and powdery mildew diseases. For control of these pests and diseases farmers were using pesticides indiscriminately which has led to increased cost of cultivation.

## Conclusion

In the frontline demonstrations there was an average increase of 26.52 per cent in grain yield over the local check. Such increase was recorded with average net returns increase was 45.39 per cent. As found in the results the BCR (2.68) was sufficiently high to motivate the farmers for adoption of the technologies. These demonstration trails also enhance the relationship and confidence between farmers and KVK scientists. The recipient farmers of FLDs also play an important role as source of information and quality seeds for wider dissemination of the improved varieties of black gram for other nearby farmers. It is concluded that the FLD programme was a successful tool in enhancing the production and productivity of black gram crop through changing the knowledge, attitude and skill of farmers.

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