

Impact of Front Line Demonstrations on Productivity and Profitability of Green Pea (var. *TSX-10*) under Mid Hills of Sikkim

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ABSTRACT

Green pea is an important rabi vegetable crop in Sikkim but due to unavailability of improved variety and non adoption of improved cultivation practices in Sikkim, its productivity (4300 kg/ha) is far below the average national productivity (9500 kg/ha). Considering the scope of improvement in productivity through the recommended technologies, 50 front line demonstrations were conducted by Krishi Vigyan Kendra, ICAR Research Complex for NEH Region, Sikkim Centre, East Sikkim, Ranipool during 2010-2015 in five different villages' at farmers' fields. Farmers' practices with local cultivar prevailing in the region were treated as control for comparison with recommended practice. Average yield of green pea increased by 17.38 per cent under recommended practice over control. An average net profit of Rs. 1,85,095 was recorded with recommended practice where as it was Rs. 1,29,038 in farmer's practice. Benefit: Cost ratio varied from 3.2 – 3.4 under demonstrations while it was only 2.4 - 2.5 for control. Front line demonstration of recommended technology revealed that yield potential and net income from green pea cultivation can lead to economic improvement and empowerment of farmers.

Key word: *Bush type, Economic, Extension gap, Green pea, Technology transfer, Yield;*

India is the second largest producer of vegetables, next only to China, in the world with a production of 40 million tonnes from four million hectares of land area. In spite of that, this seemingly high level of production can provide only 208 grams of vegetables per capita (Sharma, 2003), as against the suggested dietary intake of 275 g and 250 g per capita per day for adult male and female, respectively for undertaking moderate work (Swaminathan, 2002).

In India, the area under green peas rose continuously from 272.6 thousand hectares in 1999-2000 to 420.90 thousand hectares in 2012-2013. The production of green peas has increased from 3.20 million tonnes in 2003-04 to 4006.17 MT in 2012-13 and the productivity of green peas has also shown an irregular trend, but it slightly increased from 9143 kg/ha in 1999-00 to 9500 kg/ha in 2012-13 (Indian Horticulture Database, 2013). Area under green pea cultivation in

Sikkim is 2000 ha with a production of 8600 tonnes having productivity of 4.3 t/ha (Indian Horticulture Database, 2013). Green peas cultivation is highly labour-intensive like all other vegetable crops (Rao and Tripathi, 1979 and Khunt and Desai, 1996) and requires high dosages of organic manures and fertilizers. The main constituent of the cost of cultivation of peas is organic manures followed by cost on bullock/human labour for cultivation. At the same time, the income per hectare from vegetable crops has been almost four-times, as compared to food crops (Thakur et al. 1994). Thus, the farmers should be encouraged to diversify to more remunerative cropping patterns like vegetable cultivation instead of the traditional, less profitable ones (Maurya et al., 2001 and Sharma et al., 2000). Vegetable pea is grown in all districts of Sikkim during the rabi season.

Therefore, the present study was undertaken to

estimate the economics of production of green peas in Sikkim, and study the relative importance of different factors influencing the productivity of green peas. However, lack of systematic research on organic farming and unavailability of packages and practices for green pea limit the realization of higher yields under organic mode of cultivation. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (Prasad *et al.* 1987). Keeping this in view, the present study was undertaken to evaluate the performance of garden pea with the objective to assess the economic sustainability of garden pea variety.

METHODOLOGY

Krishi Vigyan Kendra, ICAR Research Complex for NEH Region, Sikkim Centre, East Sikkim, Ranipool conducted 50 Frontline Demonstrations on farmers field during 2010 - 2015 at five different villages *viz.*; Sajong, Rumtek, Timpyem, Rey Mindu and Nandok villages of East Sikkim. Ten green pea growers from each village were selected through purposive random sampling technique to constitute a total sample size of the study comprised of 120 (12 x 10 nos.). The area considered under each demonstration was 0.25 ha. Low yield, increased incidence of powdery mildew and high production cost were identified as major issues during survey, farmers' meeting and field visit. In order to manage these problems, improved and recommended practices were followed as new interventions during front line demonstration programmes.

In case of recommended practices bush type TSX-10 variety of pea with crop rotation, field drainage, seed treatment, plant protection measures and balanced cultural practices were followed whereas in the farmers (control plot) existing practices on Dentame matar, pole type were also followed. Bush type, TSX-10 var. of this pea was selected based on its better performance and adoptability in the selected area. Prior to conducting the demonstrations, farmers of respective villages were trained to identify technologies. Procedure for site and farmers selection, layout of demonstration and farmers participation *etc.* were followed as per the methodology followed by Choudhury (1999). Visits of the farmers and extension functionaries were organized at demonstration plots to show the significance of large scale cultivation of pea. Yield data was collected from

farmer's practices (control plots) and demonstration plots and cost of cultivation, net income, benefit: cost ratio and extension gap was calculated and analyzed.

RESULTS AND DISCUSSION

The yield performance and its related economic indicators presented in Table 2 revealed that the under demonstration plot, production of green pea yield was found to be substantially higher than the farmers' practices (control plot) during the entire demonstration period (2010-15). The yield of green pea was recorded 101.86, 102.10, 107.25, 107.95, 108.05 q/ha during five years of study. The average higher yield enhancement by the recommended technological intervention was 17.38 per cent over control. The average yield from demonstration was significantly higher than control plot which was supported by higher yield attributing parameters (Table 4). The cumulative effects of technological intervention over five years indicated average productivity enhancement of pea from the recommended practice which was far higher than the farmers practice (control). Mukherjee (2003) reported that the innovative intervention may have superior implications in enhancing productivity. Similar results were also reported by others, namely Mishra *et al.* (2009), Tiwari *et al.* (2003), Tomar *et al.* (2003), Tiwari and Saxena (2001) and Haque (2000) in different crops.

Various economic indicators like gross expenditure, gross returns, net returns and benefit: cost ratios of frontline demonstrations are also presented in Table 2. The economic indicators clearly showed that the net returns from the recommended practices were substantially higher than the control plot (farmers' practices) during the demonstration period. The average net returns from the recommended practice were much higher (Rs. 1, 85,095) in comparison to farmers practice/control plot (Rs. 1, 29,038). An average Rs. 56,057 as additional income was earned through the innovative technological interventions of the crop *viz.*, bush type of crop, crop rotation, field drainage, seed treatment, plant protection measures and balanced cultural practices. Economic analysis of the yield concluded that the benefit: cost ratios of demonstration plots were significantly higher over control during all the years. The benefit: cost ratio of the recommended practice were 3.2, 3.3, 3.4, 3.4 and 3.4 and farmers' practice 2.5, 2.5,

Table 1: Comparison between recommended practice and existing farmers practice under Green Pea FLD

Particulars	Recommended Practice	Farmers Practice
Farming situation	Rain-fed mid hill	Rain-fed mid hill
Variety	TSX-10	Dentame (local)
Sowing time	15th Sept-15th Oct	1st week of October
Land type	Flat bed method	Ridge method
Seed rate	80 kg/ha	100 kg/ha
Organic manure application	FYM @ 2 t/ha + vermicompost @ 0.5 t/ha + neem cake @ 0.5 t/ha	FYM @ 10 t/ha
Soil acidity management	Dolomite application @ 2 t/ha	Nil
Plant protection	Spray of wettable sulphur 2 g/lit or dust sulphur at 8 kg/ha	Nil
Weed management	One hand weeding at 30 DAS	Two hand weeding at 30 and 50 DAS
Mechanical support	No staking required	Staking with bamboo sticks (6 feet long) for individual plant

Extension gap = Demonstration yield – Farmers yield

Table 2: Economic indicators of FLD on green pea in Sikkim

Year	No of Demos-tration	Yield (q/ha)		% increase over FP	Gross Exp. (Rs.)		Gross Return (Rs.)		Net Return (Rs.)		B:C Ratio	
		RP	FP		RP	FP	RP	FP	RP	FP		
2010-11	10	101.86	86.52	15.0	78520	85385	254650	216300	176130	130915	3.2	2.5
2011-12	10	102.10	87.30	14.5	76900	88560	255250	218250	178350	129690	3.3	2.5
2012-13	10	107.25	87.45	18.5	78900	88250	268125	218625	189225	130375	3.4	2.5
2013-14	10	107.95	86.96	19.4	78680	90150	269875	217400	191195	127250	3.4	2.4
2014-15	10	108.05	87.00	19.5	79550	90540	270125	217500	190575	126960	3.4	2.4
Mean	10	105.442	87.046	17.38	78510	88577	263605	217615	185095	129038	3.34	2.46

Table 3: Year wise extension gap yield

Year	Extension gap (q/ha)
2010-11	15.3
2011-12	14.8
2012-13	19.8
2013-14	20.9
2014-15	21.1
Mean	18.4

Table 4. Yield attributing parameters under Recommended Practice and Farmers' Practice

Yield parameters	Recommended Practice	Farmers Practice
Plant height (cm)	76.2	184.5
No of pod/plant	9.6	12.5
No of seeds/pod	9.5	4.2
Pod weight (g)	7.9	4.8

2.5, 2.4 and 2.4 during the study period. The overall average benefit: cost ratio of 3.34 in recommended technology and 2.46 from farmers practice was calculated. The benefit: cost ratios of the system proved the economic viability of the interventions made under demonstration and convinced the farmers on the utility of the interventions. *Mishra et al. (2009)* in potato, *Sharma (2003)* in moth bean and *Gurumukhi and Mishra (2003)* in sorghum have reported similar findings. The data also revealed that the maximum increase in yield was recorded in the 2014-15 with maximum benefit: cost ratio of 3.4. The variation of benefit: cost ratio during the different years may be related to the yield performance and other inputs and production in that particular year. The extension gap ranging between 14.8-21.05 q/ha (Table 3) during the period of study, emphasizes the need to educate the practicing farmers through various means for adoption

of improved agricultural production to reverse the trend of wide extension gap.

CONCLUSION

The results of frontline demonstrations showed that the green pea yield could be increased by 14.5 to 19.5 per cent with the help of innovative technological intervention coupled with the proper management of disease in five different villages of East Sikkim. High

benefit: cost ratio also advocated the economic viability of the demonstration and motivated the farmers towards adoption of interventions demonstrated. The suitable technology for enhancing the productivity of green pea crop, and need to conduct such demonstrations may lead to economic improvement and empowerment of farmers. It will also provide impetus to the diversification programme of the state government, besides improving the soil health, being a leguminous crop.

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