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Introduction of *palak* (*Spinacia oleracea* L.) in Ernakulam district of Kerala through front line demonstration and on farm testing

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ABSTRACT

On Farm Testing (OFT) of *palak* were conducted in Ernakulam Krishi Vigyan Kendra during 2012-13. Highest green leaf vegetable yield (18.00.q/ha) was recorded in variety Harit Shobha and All Green in first year with farmers practice. Programme was continued in 2nd year under Front Line Demonstration (FLD). It was observed that Harit Shobha cultivar gave 20.0 q/ha^{-1} green leaf yields which was higher over All Green and farmers practice. An average yield of two cultivar Harit Shobha and All green was 15.5 q/ ha^{-1} and 17.7 q ha^{-1} in OFT and FLD, respectively. The average technology gap, extension gap and technology index of 2.9 q ha^{-1}, 9.5 q ha^{-1} and 38 per cent and 1.8q ha^{-1}, 7.5qha^{-1} and 30 per cent during first and second year, respectively. Technology index reduced from 38 to 30 per cent during the study period means technology was accepted by the farmers. As a result, 500 farmers initiated the small scale farming of *palak* in the district with the technical guidance provided from KVK.

Key Words: On farm testing (OFT), Front line demonstration (FLD) and *Palak*.

INTRODUCTION

Palak (*Spinacia oleracea* L) is one of the most common leafy vegetable of tropical and sub tropical regions. The popular *palak* growing states include Uttar Pradesh, West Bengal, Maharashtra, Rajasthan, Punjab, Haryana and Gujarat. However, *Palak* is not cultivated in southern states like Kerala. It has very good market demand due to its nutrient contents, medicinal properties and taste. But the cultivation of *palak* in Kerala is not common due to non-availability of seeds and package of practice and also use of *red chira and green chira* (*Amaranths* sp.) is more common. In this context introduction of the *palak* in Kerala may prove better alternative to traditional *amaranths* because it is more nutritious. *Palak* is a cool season leafy vegetable, generally cultivated in the sub tropical and temperate conditions. Amongst all the vegetables, the leafy vegetables have a very high protective food value. They are rich in mineral and hence can be called as "Mines of minerals". Beside this, soft fibrous matter is specially in providing necessary roughage in diet. It is rich and cheap source of vitamin A, iron, essential amino acids and ascorbic acid etc.

Green leafy vegetables have long been recognized most abundant sources of protein, vitamins and minerals (Aletor *et al*., 2002; Shukla *et al*., 2006). Antioxidants vitamins like ascorbic acids, phenols etc. are important in human food since they function as an anticancer agent. Many leafy vegetables especially spinach has attained commercial status and its cultivation is wide spread in India particularly northern states.

Keeping these points in view, a study was planned by KVK, Ernakulum of CMFRI to popularize *palak* cultivation in Kerala during 2012-13 and 2013-14 using the concept of OFT, FLD and farmers fare.

MATERIALS AND METHODS

The study was carried out by Krishi Vigyan Kendra, Ernakulum of ICAR- Central Marine Fisheries Research Institute, Narakkal, Kochi, Kerala. KVK has adopted five villages, purposively. Varieties All Green and Harit Shobha of *palak* developed by IARI were used in both OFT and FLD programme during 2012-13 and 2013-14 and FLD and OFT were organised.

Seed of Harit Shobha and All Green high yielding variety (HVYs) of *palak* and partial quantity of cow dung and fertilizer were given to the farmer as critical input under the front line demonstration *Palak* cultivation. In the first year five beneficiary farmers were selected under On Farm Trial of *palak* crop. The crop was grown during *rabi* season in the month of January to April from 2012 -13 and 2 year this programmer continue under Front Line Demonstration of *palak* crop and 10 farmer were select in different village. Farmers field were located in different villages i.e. Mooknoor, Anagmali, Provoor, Ernakulum, Kumbalgi, Chotanikara under OFT Programme. During first year of study an area of one ha was covered with 25 cent area for each farmer under On Farm Trial on Scientific *palak* cultivation and 2nd year selected two ha area with active participation of 50 farmers. The demonstrations were

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conducted by involving the Agriculture Officers of State Department of Agricultural who played as facilitators role in identifying innovative farmers and monitoring of *palak* field along with KVK scientist of CMFRI. Before conducting FLDs. farmers list was prepared from groups meeting, discussions and specific skill training were given to the selected farmer regarding package of practices of *palak*.

The package of practices included were improved varieties, seed treatment, maintenance of optimum plant stand, recommended fertilizer dose. The broadcast sowing was done and during the 2nd year also same procedure was adopted in scientific *palak* cultivation. A harvest mela was organized at farmer's field at Kumbalangi and popularised through print and visual media. In continuation to this about 200 farmers expressed their interest for initiating *palak* cultivation in Kerala. Thereafter, KVK initiated the supply of *palak* seeds through its sales counter. Interestingly, traditional Amaranths farmers were turned as *palak* cultivators in the district. Presently about 500 farmers are doing *palak* cultivation in the district covering a small area of 20 ha^{-1} which is only 25 cent per farmer of that area.

To study the of front line demonstration out of 50 participating farmer, total of 20 farmer were selected as respondent through proportionate sampling. Production and economic data for FLDs and local practices were collected and analyzed. The extension gap, technology gap and technology index were calculated using the formula as suggested by Kumar (2014 a).

Extension gap (qha^{1}) =
Demonstration yield (qha^{1}) – yield of local check (qha^{1})

Technology gap (qha^{1}) =
Potential yield (qha^{1}) - Demonstration yield (qha^{1})

Technology index (%) =
Potential yield (qha^{1})- Demonstration yield/ Potential yield x100

RESULTS AND DISCUSSION

Farmer's field *palak* cultivation problems were documented in this study. The ranking given by the different farmers are given in Table 1. Preferential ranking scientific techniques were utilized to identify the constraints faced by the respondent in *palak* production. A perusal of data in table-1 indicated that lack of suitable high yielding variety (HYV) (90.00%) was given the top most rank followed by low technical knowledge (75.00%). Other constraint such low or erratic rainfall, labour cost high and post harvest management were found to reduce *palak* production. Other studies conducted by Hassn *et al*., (1998); Ouma *et al*., (2002); Dhaka *et al*., (2010); Ranawat *et al*., (2011); Dhruw *et al*., (2012) and Sreelakshmi *et al*., (2012) at different locations have also reported similar problem in different crops.

Table 1: Ranks given by farmers for different constraints n=50

Constraints	Percentage	ranks
Lack of suitable HYV	90.00	I
Labour problem	75.00	III
Low soil fertility	40.00	VII
Marketing	50.00	IV
Low technical knowledge	65.00	II
Wild animals	45.10	V

A comparison of productivity levels between OFT and FLD varieties and local leafy vegetable crop variety is shown in Table 2. During both years under study, it was observed that productivity of *palak* in Ernakulum district under improved production technologies ranged 15.00 to 20.00 q/ ha^{-1} for the varieties Harit Shobha and All Green and local variety. Yield of the On farm trial and front line Demonstration and potential yield of the different varieties of crop were compared to estimate the yield gaps which were further categorized into technology index. The technology gap showed the gap in the OFT and FLD yield over potential yield and it was 20 and 25q/ ha^{-1}. Lower Technology index show the feasibility of the new varieties at the farmers field as lower the value of technology index more is the feasibility. Table 2 revealed that the technology index value was 38 and 30. The finding of the present study are in line with the finding of Sawardekar *et al* (2003) and Dhaka *et al* (2010) Kumar (2012), Kumar (2013), Kumar (2014)a and Kumar, (2014)b.

The extension gap showed in decreasing trend. It was 2.1 and 2.9 in All Green and Harit Shobha reduced to 1.35 and 1.80 q/ha^{-1} during the study period, respectively. This emphasizes the need to educate the farmers through various mean for adoption of improved agricultural production technologies. The trend of technology gap (ranging between 7.5 to 9.5 and 5.5 to 7.5.q/ha^{-1}) reflect the farmer cooperation in carry out such demonstration with encouraging results in subsequent year. The technology gap observed might be attributing to the dissimilarity in soil fertility status and weather condition. Mukharji (2003) have also suggested that depending on identification and use of farming situation, specific intervention may have more implication in enhancing system productivity. Similar finding were also recording by Mitra *et al* (2010) and Katare *et al* (2011). The technology index showed the feasibility of the evolved technology at the farmer field.

The economic feasibility of improved technology over traditional Farmers practices was calculated depending on the prevailing prices of inputs and output cost (Table 3). It was found that cost of production of *palak* under improve technology varied from Rs.30000 to 36000 ha^{-1} in case of All Green and Rs 36400.to 40000 in Harit Shobha. The addition cost incurred in the improved technology was mainly due to more cost involved in the cost of improved seed only. On Farm Testing and Front line demonstration recodes higher mean gross returns Rs.35600. ha^{-1} and means net return Rs19600 ha^{-1} with higher benefit ratio 2.21 under improved technology of different improved variety.

Table 2: Yield of *palak* as influenced by improved production technologies and high yielding varieties over local practices in farmer's field

Year	variety	Areaha	Demo. No.	Potential Yield(qha^{-1})	Yield (qha-1) improved technology				Extension gap (qha-1)	Technology gap (q/ha)	Technology Index (%)
					Max.	Min.	Av.	local			
2012-13	All Green	1	5	20.00	15.00	10.00	12.50	10.40	2.10	7.50	37.5
2012-13	Harit Shobha	1	5	25.00	18.00	13.00	15.50	12.60	2.90	9.50	38.0
2013-14	All Green	2	10	20.00	18.20	13.50	15.85	13.50	1.35	5.50	27.5
2013-14	Harit Shobha	2	10	25.00	20.00	15.00	17.50	15.70	1.80	7.50	30.0

Table 3: cost of cultivation (Rs.ha^{-1}), net returns (Rs.ha^{-1}) and Benefit: Cost ratio of *palak* as affected by improved production technology over local practise

Year	Variety	Total cost of cultivation (Rs.ha^{-1})		Gross return(Rs.ha^{-1})		Net return (Rs.ha^{-1})		Benefit :cost ratio		Add. Cost of cultivation	Add. Net returns (Rs.ha^{-1})
		Improved technology	Local check	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check		
2012-13	All Green	15000	12000	30000	20800	15000	8000	2.0	1.73	9200	7000
2012-13	Harit Shobha	15500	12000	36000	25200	20500	13200	2.32	2.1	10800	7300
2013-14	All Green	16500	13000	36400	27000	19900	14000	2.20	2.07	9400	5900
2013-14	Harit Shobha	17000	13000	40000	31400	23000	18400	2.35	2.41	8600	4600
Average		16000	12500	35600	26100	19600	13400	2.21	2.07	9500	6200

CONCLUSION

On the basis of the results obtained in present study it can be conclude that the yield gap between conventional practices and improved production technology of *palak* cultivation can be reduced by organising further FLD and OFT at farmers field in different areas. Among the constraints the study revealed that lack of suitable HYV seed as major constraint by the beneficiaries and is ranked first followed by low technical knowledge.

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