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RESEARCH ARTICLE :

Impact of front line demonstration on the yield of chilli (*Capsicum annuum* L.)

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SUMMARY : Chilli is one of the important commercial crops which play a major role in supplementing the income to small and marginal farmers of Mokokchung district. However, the major constraints of traditional chilli cultivation are low productivity due to use of inferior seeds and non-adoption of recommended package of practices. To solve these problems, front line demonstrations were conducted at farming situations with participation of farmers. The cultivation practices in these FLDs (*i.e.* use of improved cultivars, proper nursery raising, balanced fertilizer application etc.) increased the yield by 14.93 per cent, on average as compared to the farmers practice (7.7 q/ha). The highest extension gap was 1.35 q/ha while the technology index, which is inversely correlated to the feasibility of the improved technology in the farmers' fields was 27.6 per cent. The adoption of improved technology under FLDs resulted in higher gross returns (Rs.54300/ha), net returns (Rs.29200/ha) and benefit:cost ratio (1:2.16) as compared to farmers' practice.

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KEY WORDS :
FLD, Chilli, Yield, Technology gap, Extension gap, Technology index

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BACKGROUND AND OBJECTIVES

Chilli (*Capsicum annuum* L.) is one of the most valuable spice crops in India. The crop is grown largely for its fruit. It is an indispensable spice essentially used in every Indian cuisine due to its pungency, spice, taste, appealing odour and flavour. Chilli fruits are rich source of Vitamin C, A and E. In spite of the increasing demand for the crop the yield is low to fulfill the domestic demand. Main reasons for low yield in chilli are low coverage of high yielding varieties/hybrids, heavy incidence of pest and disease and lack of adoption of scientific package of practices (Indira *et al.*, 2001). The improved technologies developed by research institutes were also found to be financially attractive. Yet adoption levels for several components of the improved technology were low emphasizing the need for better dissemination (Kiresur *et al.*, 2001). Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential and these are needed to be addressed.

Crop growth and yield are limited through poor plant nutrition and uncertain water availability during the growth cycle. Inappropriate management may further reduce

Table A : Particulars showing the details of chilli cultivation under front line demonstration and existing farmer practices

Sr. No.	Operation	Existing practices	Improved practices demonstrated
1.	Variety	Local seeds	Improved seed Guntur hope
2.	Seed treatment	No seed treatment	Seed treatment with carbendizim(2g/kg seeds) or imidacloprid 70WS (10 g/kg seeds)
3.	Raising of seedlings	Broadcasting of seeds in flat beds	Raised nursery beds
4.	Fertilizer application	Do not apply	FYM – 25 t/ha N:P:K@100:50:50 kg/ha Dipping of seedlings with bio-fertilizers (VAM and *Azospirillum*)
5.	Pest management	Do not practice	Adoption of plant protection measures
6.	Quality improvement at farm level	Un-hygienic	Adoption of improved post harvest management

the fertility of soil (Rabbinge, 1995). Demonstration is one of the most powerful extension tools in communication of new ideas, methods and techniques in agricultural development. It helps to convince the farmers faster than any other method through the process of observing, hearing, learning by doing and experiencing things (Pathak, 1999). The improved cultivation practices followed in the national demonstrations have already shown high yield potentials (Anonymous, 2012).

Mokokchung district has sizable area under chilli cultivation but the productivity is very low. The low productivity of chilli crops poses a threat to economic security of small and marginal farmers. There has been great competition in the market for chilli and hence, there is need to improve the crop with respect to production and quality. Keeping the above points in view, the front line demonstrations (FLD) on chilli was initiated with objectives of showing the productive potentials of the improved production technologies under real farm situations over locally cultivated chilli crop.

RESOURCES AND METHODS

The present study was carried out by the Krishi Vigyan Kendra during *Kharif* season from 2013 - 14 to 2014 - 15 in the farmers fields of 3 villages under Mokokchung district of Nagaland. In total 20 front line demonstrations in 10 ha area in different villages were conducted. Planting of seedlings was done during March - April with a spacing of 45 x 30 cm in the demonstration plots while in check plots traditional method was followed. Fertilizers were given as per improved practices as basal dose as well as top dressing. Chemicals were applied as per recommendation as and when required. Materials for the present study with respect to FLDs and farmers practices are given in Table A. In case of local check plots, existing practices were used. Data on output of chilli cultivation from FLD plots as well as local practices commonly adopted by the farmers of the villages were collected. In demonstration plots, few critical inputs in the form of quality seed, balanced fertilizers, agro-chemicals, FYM etc. were provided and non-monetary inputs like timely transplanting, weeding and eathing up were also performed, whereas traditional practices were maintained in case of local checks. The demonstrations on farmers fields were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc. Training and field days and timely field visits were also conducted. Study of technology gap, extension gap and technology index were calculated as suggested by Samui *et al.*(2000).

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield}$$

$$\text{Extension gap} = \text{Demonstration yield} - \text{Farmers yield}$$

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Yield and yield parameters :

A comparison of yield parameters and productivity levels between improved practices in demonstration plots and farmers' practices is shown in Table 1. Yield and yield attributing parameters *viz.*, number of fruits per plant, fruit length (cm), fruit diameter (cm), fruit yield (g/plant), total fresh fruit (kg/ha) were recorded highest in demonstration plots as compared to farmers traditional practices. On an average 14.93 per cent more yield of

chilli was recorded as compared to farmers practice (7.7 q/ha). Singh *et al*. (2011) also reported increase in yield of 28.22 per cent in tomato, 29.17 per cent in chilli and 21.43 per cent in brinjal in Rajasthan condition through FLDs on improved production technology. Similarly, yield enhancement in different crops in front line demonstration has amply been documented by (Haque, 2000; Sagar and Ganesh, 2003; Singh *et al.*, 2007; Mishra *et al.*, 2009; Kumar *et al.,* 2010 and Singh and Sharma, 2004). The results indicated that the front line demonstrations have given a good impact over the farming community of Mokokchung district as they were motivated by the new agricultural technologies applied in the FLD plots. This finding is in corroboration with the findings of Poonia and Pithia (2011).

Technology gap :

The technology gap in the demonstration yield over potential yield was 3.45 q/ha for chilli. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions (Mukherjee, 2003) (Table 1). Hence, variety wise location specific recommendation appear to be necessary to minimize the technology gap for yield level in different situations

Extension gap :

The highest extension gap of 1.35 q/ha (Table 1) was recorded during the period of study emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead the farmers to discontinue the old technologies and to adopt new technology. This finding is in corroboration with the finding of Hiremath and Nagaraju (2010).

Technology index :

The technology index shows the feasibility of the evolved technology at the farmer's fields. The lower the value of technology index more is the feasibility of the technology (Jeengar *et al.,* 2006). The technology index was 27.6 per cent for chilli (Table 1).

Economic return :

The input and output prices of commodities prevailed during the demonstrations were taken for calculating cost of cultivation, gross returns, net returns and benefit: cost ratio (Table 2). With the adoption of improved technology under FLDs, higher gross returns (Rs.54300/ha), net returns (Rs.29200/ha) and B : C ratio (1:2.16) was recorded as compared to farmers practices of Rs. 46200/ ha gross return, Rs. 21625/ha net return and B : C ratio of 1:1.87. This may be due to higher yields obtained under improved technologies compared to farmers traditional practice. These results are in conformity with the findings of Hiremath *et al. (*2009) and Mokidue *et al*. (2011).

Reasons for low yield of chilli at farmers' fields :

Optimum sowing time was not followed due to non-availability of quality seed. Moreover, farmers sow the seed following broadcast method due to which the plant population becomes 2 - 3 times more than the recommended one. Lack of popularization of seed cum fertilizer drill for sowing and use of inadequate and imbalance doses of fertilizers especially the nitrogenous and phosphatic fertilizers by farmers could not result into potential yield. Chemical control of weeds, pest and diseases are also quite uncommon in this district.

Table 1 : Productivity, technology gap, extension gap and technology index of chilli under FLDs and existing practices

Year	Area (ha)	No. of FLDs	Yield (q/ha)		% increase over farmers practice	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
			FLD	Farmers practice				
2013 – 14	5	10	9.2	7.9	14.13	3.3	1.3	26.4
2014 – 15	5	10	8.9	7.5	15.73	3.6	1.4	28.8

Table 2 : Cost of cultivation (Rs./ha), gross return (Rs./ha), net return (Rs./ha) and B:C ratio as affected by improved and local technologies

Year	Cost of cultivation (Rs./ha)		Gross return (Rs./ha)		Net return (Rs./ha)		B : C ratio	
	FLD	Farmers practice	FLD	Farmers practice	FLD	Farmers practice	FLD	Farmers practice
2013 – 14	25350	24950	55200	47400	29900	22450	2.18	1.89
2014 – 15	24900	24200	53400	45000	28500	20800	2.14	1.86

Specific constraints with marginal/sub marginal farmers small holding:

Traditional implements and tools are still in practice due to small holding which have poor working efficiency. The lack of simple modern tools for small holding also hinders the adoption of improved technology. Small and marginal farmers have less capability to take risk and do not dare to invest in the costly input due to high risk and the poor purchase capacity of small farmer. Thus, the adoption of well proven technology is constrained due to small size of holding and poor farm resources.

Conclusion :

Frontline demonstration is the most suitable method for assessing the performance of the improved technology as it directly involves the scientists in conducting the demonstrations at the farmers' field which enables them to have first hand information related to the technology. Technological and extension gap extended can be bridged by improved package of practices with emphasis on improved variety, use of proper seed rate, balance nutrient application and proper use of plant protection measures. Replacement of local variety with improved variety of chilli would increase the production and net income to the farmers. Hence, the concept of FLD may be applied at more farmers' fields for speedy and wider dissemination of the recommended practices which will subsequently improve the livelihood of the farming community.

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