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Impact Assessment on Frontline Demonstration for Popularization of Toria in Longleng District of Nagaland

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ABSTRACT

The present study was carried out in four different villages under Longleng district of Nagaland, India. KVK, Longleng conducted a frontline demonstration of HYV of toria (TS 36). A total of 32 nos. of FLDs were evaluated to find out the yield gaps between HYV toria variety TS 36 and variety grown by farmers. Yield data of both demonstration and farmers practice were recorded and their yield gap, technology gap, extension gap and technology index were analyzed. Results revealed that the Toria yield (Cv. TS 36) was recorded 40.6 to 40.7 per cent higher over farmer's variety. On an average, technology gap was recorded 4.10 q/ha, while the average extension gap was recorded 2.40 q/ha. Average technology index was recorded 34.10 percent. Average net return was found Rs.15375.50/ha and Rs.8637.50/ha with demonstration and farmers practice respectively. Higher benefit-cost ratio, production efficiency and economic efficiency were recorded in the demonstration plot than the farmer's practice.

KEYWORDS

Yield gap, Technology gap, Extension gap, Technology index, Frontline demonstration, Economics

INTRODUCTION

Oilseed crops are a significant part of the agricultural economy in India (Singh *et al.*, 2017). India is the fourth largest oilseed economy in the world. Rapeseed and Mustard is the second most important edible oilseed after ground nut share is 27.8 per cent in India's oil seed economy . In terms of acreage, oilseeds occupy 14.1 per cent and rape seed mustard alone occupies 3 per cent of the total cropped area in the country (Shekhawat *et al.*, 2013) and Northeastern India having the area of 483300 ha with productivity 938.80 kg/ha, which is below the national level productivity of 1183 kg/ha (Agricultural Statistics of India, 2016-17). In the context of Nagaland, Oilseeds occupied an area of 67300 ha and production (69500 tonnes) with productivity 1032 kg/ha. Rapeseed and mustard area and production is 27280 ha and production 27600 tonnes. It is cultivating under Longleng District in rice-fallow which contributes 980 ha area and production 990 tonnes with productivity 1010 kg/ha and share 3.6 % of total production in the state. (Anonymous, 2017).

The demand of oilseeds was not fulfilled in the district at present production due to less area and productivity (Singh *et al.*, 2017). However, with the available improved technologies, it is possible to bridge the yield gap and increase the productivity of toria. The reasons for low productivity are poor knowledge about newly released variety, crop production, protection technologies and their management practices in the farmer's field as toria is one of the major oilseed crops in Longleng district of Nagaland. Therefore, KVK, Longleng has conducted various FLDs on toria using high yielding variety TS -36 two consecutive year of 2016-17 and 2017-18 with the objectives of showing the production potential of the new production technologies under actual farming situation. Keeping the above points in view, the present study was undertaken to find out the effects of FLDs on bridging the yield gap in terms of technology gap, extension gap `and technology index (Singh *et al.*, 2020).

MATERIALS AND METHODS

Krishi Vigyan Kendra, Longleng is situated at 26° 26' 0" N Latitude, 94° 52' 0" E Longitude at altitude of 1366 m MSL. The soil is generally high in soil organic carbon (1.4- 1.7%), low to medium in available N (274-331 kg/ha) and K (170-181 kg/ha) and low to medium in available P (10-14 kg/ha). Total annual rainfall varied between 1406 mm to 1793 mm during 2016-17 and 2017-2018 and average annual rainfall was 598.5 mm during (October-January) cropping period. The monthly mean maximum and minimum temperatures during the study period ranged from 24.16 to 32.92 ^{0}C and 12.32 to 24.50^{0}C, respectively.

Frontline demonstrations on Toria (Cv. TS 36) was conducted under Lowland rice - fallow by Krishi Vigyan Kendra, Longleng in different villages under the district in an area of 12.0 ha and 20.0 ha during the year 2016-17 and 2017-18 respectively. Toria was sown as second crop in residual soil moisture just after harvesting of Lowland rice during the last week of August to 1st week of October (Table 1). The recommended doses of fertilizers (RDF) was applied @ 60:50:40 kg NPK/ha with sources of DAP and MOP. If necessary, weeding was done to field free from weed up to 35 days. Neem oil was sprayed @ 3-4 ml per litre of water to manage the insect pest and disease problem at interval of 7-10 days. The Toria crop matured in 115-120 days.

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Table 1: Difference between demonstration package and farmers practices of Toria

Particulars	Demonstration package	Farmers' practices
Variety	TS36	Local
Seed rate	8 kg	10-12 kg
Sowing method	Line/Broadcasting	Broadcasting
Sowing time	15-25 October	20-30 October
Fertilizers' doses	30:20:30 kg NPK/ha	Without NPK
Weeding	One weeding	No weeding
Plant protection measures	Need based spray of neem oil	No spray

The yield data from the demonstration and farmers practice were recorded and their technology gap, extension gap and the technology index were worked out using methods developed by Samui *et al.* (2000) as stated below:

Technology gap = Potential yield – Demonstration yield
Extension gap = Demonstration yield – Farmer's practice yield
Technology Index : Potential yield- Demonstration yield/ Potential yield

$$\text{Technology Index} = \frac{\text{Potential yield - Demonstration yield}}{\text{Potential yield}}$$

RESULTS AND DISCUSSION

Productivity and technology gap

FLDs were conducted during 2016-17 and 2017-18 in 28 ha area with 207 nos. of demonstration at farmer's field covering four different villages of Longleng district of Nagaland. Results indicated that the yield of toria variety TS 36 was substantially higher than the variety grown by the farmers during both the years (Table 2).

Table 2: Productivity and technology gap

Year	Area	No. of Demo	Potential yield (q/ha)	Average yield (q/ha)		Increase over farmer practice (%)
				Demo	Local	
2016-17	12.0	60	12.0	7.60	5.40	40.7
2017-18	20.0	147	12,0	8.20	5.60	46.4
Total	32.0	207	-	15.8	11.0	-
Average	-	-	-	7.90	5.50	43.58

The yield of toria in different demonstration plots was recorded 7.60 q/ha and 8.20 q/ha in the year 2016-17 and 2017-18 respectively, which was 40.70 and 46.40 percent higher over farmer's practice. On an average 43.58 percent increase in yield was obtained in the demonstration plots whereas average yield in farmer's field was recorded only 5.50 q/ha. Higher yield was obtained 8.20 q/ha during the year 2017-18 than 7.60q/ha in the year 2016-17. These results conform with Ahmed *et al.*, (2017), Dutta (2014) and Sarmah *et al.* (2014). The reduced productivity in farmers practice might be mainly due to factors like use of non-descript local variety and low level of agronomic management in addition to non-availability of resources in time. The result depicts the positive effects of FLDs over the existing practices towards enhancing the yield of toria in the District.

Extension gap and technology index

The extension gap was obtained 2.2 q/ha and 2.6 q/ha during the year 2016-17 and 2017-18 respectively (Table 3). It emphasizes the need to educate the farmer through various means for adoption of improved agricultural production to reverse the trend of wide extension gap. To increase the productivity and production of toria, seed replacement of non-descriptive varieties by HYVs is very much essential. In this context, front line demonstrations are playing an important role in popularizing the HYV of toria among the farming community. The technology gap 4.4 and 3.8 q/ha during 2016-17 and 2017-18, respectively. The average technology gap was recorded at 4.1 q/ha during the period of study. The variation in the technology gap observed might be due to dissimilarity in soil fertility and management factors. The technology index showed the feasibility of evolved technology at the farmer's fields. The lower value of technology index the more is the feasibility of technology (Kumar *et al.*, 2014). As such reduction of technology index varying from location to location, which exhibited the feasibility of technology demonstrated. Similar yield enhancement in different crops in front line demonstration has amply been documented by Mishra *et al.* (2009). The technology index was recorded 36.6 percent and 31.6 percent during the year 2016-17 and 2017-18 respectively, with average technology index of 34.10 percent. As such fluctuation in technology index (ranging during the study period in certain villages, might be attributed to the dissimilarity in soil fertility status, weather conditions, non-availability of irrigation water and insect pest attack in the crop. A similar finding was reported by Dutta (2014) in rapeseed and mustard and findings of Mitra and Samajdar (2010). They opined that lower the value of technology index; more is the feasibility of the technology demonstrated.

Table 3 : Extension gap, technology gap and technology index in toria

Year	Area	No. of Demo	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
2016-17	12.0	60	2.2	4.4	36.6
2017-18	20.0	147	2.6	3.8	31.6
Total	32.0	207	4.8	8.2	68.2
Average	-	-	2.4	4.1	34.10

Economics of demonstrated technology

Net return and benefit-cost ratio were recorded Rs.14048/ha, Rs.16073/ha in demonstration plots and Rs.8195/ha, Rs.9080/ha in farmer's practices during the year 2016-17 and 2017-18, respectively(Table 4). Hence, higher B:C ratios proved the economic viability of the interventions made under FLD. Similar findings were reported by Ahmed *et al.*, (2017), Dutta (2014) and Sarmah *et al.*, (2014) in rapeseed and mustard. Higher mean production efficiency and economic efficiency of two years were recorded 7.38 kg/ha/day and 143.7 Rs/ha/day respectively in demonstration plot than the farmers practice (4.66 kg/ha/day, 73.2 Rs/ha/day respectively). Therefore, to exploit the potential of improved production and protection technologies efforts through FLDs ought to be increased awareness among the farmers.

Table 4 : Economic comparision of demonstrated technology

Year	Net return (Rs/ha)		B:C ratio		Production efficiency (kg/ha/day		Economic efficiency (Rs/ha/day)	
	Demonstrated plot	Farmers practice	Demonstrated plot	Farmers practice	Demonstrated plot	Farmers practice	Demonstrated plot	Farmers practice
2016 -17	14048	8195	1.72	1.52	7.10	4.58	131.3	69.5
2017 -18	16703	9080	1.85	1.58	7.66	4.75	156.10	76.9
Average	15375.5	86375.5	-	-	7.38	4.66	143.7	73.2

CONCLUSIONS

It may be concluded that adoption of improved production technology can reduce the technology gap to a considerable extent, thus leading to increased productivity of rapeseed-mustard in the district. Moreover, Krishi Vigyan Kendra in the district needs to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better oilseed production in the district. More efforts should be made to motivate the farmers for adoption of improved agricultural technologies including HYV to revert the trend of wide extension gap and also increase their family income.

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