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Evaluation and Impact of Front Line Demonstrations on Productivity of Oilseeds in Konkan Region of Maharashtra

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ABSTRACT: *Oilseeds form the second largest agricultural commodity in India after cereals sharing 14 % of gross cropped area and accounting for nearly 3 % of the gross national product and 10% of value of all agricultural products. Maharashtra State rank third in major oilseed growing States with 14.4% of total oilseed production. From Konkan region of Maharashtra, 250 respondents who had actually undertaken the Front Line Demonstration(FLD) with control trial were selected for the study. The evaluated data showed that, the technology gap was more except groundnut variety SB-11 and TAG-24. The lowest technology index was observed in variety TAG-24 and thus found best for cultivation in Konkan region. Nearly all the niger and sunflower varieties except few, the extension gaps was higher than the technology gaps resulting into low adoption of technology on farmers field.*

The per cent increase in yield was higher in niger (50.84 per cent) followed by sunflower (45.26 per cent), rabi-summer groundnut (32.90 per cent) and kharif groundnut(31.32 per cent). The comparative profitability of different oilseed crops in demonstrated plots shows that the highest benefit:cost ratio was obtained in rabi-summer groundnut(1.63) followed by niger(1.62), kharif groundnut(1.48) and sunflower(1.43). The factors responsible for low B:C ratio in local check plot was because of adopting traditional methods of cultivation.

Key words: *demonstration, impact, oilseeds, productivity*

INTRODUCTION

Oilseeds are among the priority crops of the Asia Pacific and Asia Pacific Association of Agriculture Research Institutions (APAARI) has been given a high priority to this group in regional context. Over 10 annual oilseed crops of food and industrial value are grown in the region, with higher diversity in the South, the Southeast and the East Asia. Oilseeds form the second largest agricultural commodity in India after cereals sharing 14% of gross cropped area and accounting for nearly 3% of the gross national product and 10% of value of all agricultural products.

India is among the largest oil economics in the region/world. The country also occupies a distinct position in terms of diversity in annual oilseed crops. The strategy under Technology Mission on Oilseeds (TMO) catalyzed increased production of the oilseeds resulting in "Yellow Revolution" in the country. A turnaround situation began significantly from mid 1990's. The import of vegetable oils went up from mere 0.35 million tonnes during 1994-95 to 4.2 million tonnes by 1999-2000 and a record of 56.7 million tonnes in 2008-09 valued at ₹ 15819 crores. Exports of oilcakes/extraction increased from mere ₹ 134 crores in 1985-86 to ₹3495 crores in 1996-97 and ₹10269 crores in 2008-09. So far more than 750 improved varieties and hybrids in oilseeds have been released for cultivation.

Maharashtra State rank third in major oilseed growing States with 14.4% of total oilseed production. In Konkan region of Maharashtra, efforts are being put in to boost up the oilseed production and also its productivity. With this in view a study was conducted to study the evaluation and impact of Front Line Demonstrations on productivity of oilseeds in Konkan region of Maharashtra State.

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METHODOLOGY

The present study was conducted in 25 villages from Konkan region of Maharashtra. For selection of respondents, a total list of FLD farmers was collected from four KVKs. By adopting systematic sampling design 250 respondents who had actually undertaken the demonstration with control trial were selected for the study. The data was collected one year after FLD programme through personal interview technique with the help of interview schedule developed for the study.

This gap index was calculated with the help of formula given below:

Technology gap = Pi – Di

Extension gap = Di – Fi

$$\text{Technology index} = \frac{Pi - Di}{Pi} \times 100$$

Where,

Pi =Potential yield of the crop

Di =Demonstration yield of the crop

Fi = Farmers plot (Local) yield

Impact of technology was calculated by considering per cent increase in yield of demonstration plot over local check in percentages. Further, per hectare cost of oilseed crop was worked out by total sum of expenditures of land preparation, seeds, manures and fertilizers, plant protection measures and labour component.

RESULTS AND DISCUSSION

The evaluation of front line demonstration programme is necessary for measuring effectiveness as well as to analyze the impact of demonstrations on productivity of oilseeds of demonstrator farmers.

Technology gap and extension gap

The technology gap was due to non-transferable technologies such as recommended plant population per hectares and environmental differences between Research station and KVK focal village. The extension gap was due to resource-cum-management-cum-extension efforts. It is difference between the yield obtained due to adoption of technology in demonstration plot and yield obtained from traditional method of cultivation.

Table 1
Technological and extension yield gap and Technology Index for demonstrated *kharif* groundnut technology

Year	*Variety used*	*Location (District)*	*No. of Demo*	*Yield (q/ha)*			*Techno-logy gap (q/ha)*	*Exten-sion gap (q/ha)*	*Technology index (%)*
				Potential	*Demo*	*Local check*			
2008-09	TG- 26	Sindhudurg	10	25.00	17.68	13.00	7.32	4.68	29.28
2008-09	TG- 26	Ratnagiri	13	25.00	19.70	14.80	5.30	4.90	21.20
2009-10	TAG-24	Sindhudurg	15	22.00	16.74	12.41	5.26	4.33	23.91
2009-10	Konkan Gaurav	Ratnagiri	12	20.00	14.83	12.30	5.17	2.53	25.85
		Average	**50**	**23.00**	**17.23**	**13.12**	**5.77**	**4.11**	**25.08**

Table 2
Technological and extension yield gap and Technology index for demonstrated *rabi-summer* groundnut technology

Year	*Variety used*	*Location (District)*	*No. of Demo*	*Yield (q/ha)*			*Techno-logy gap (q/ha)*	*Exten-sion gap (q/ha)*	*Technology index (%)*
				Potential	*Demo*	*Local check*			
2008-09	TAG-24	Sindhudurg	10	22.00	19.30	15.15	2.70	4.15	12.27
2008-09	TAG-24	Thane	10	22.00	20.20	15.90	1.80	4.30	8.18
2008-09	TG- 26	Sindhudurg	05	25.00	22.20	15.00	2.80	7.20	11.20
2008-09	TG- 26	Ratnagiri	13	25.00	19.00	14.80	6.00	4.20	24.00
2008-09	TG- 26	Raigad	10	25.00	19.70	14.32	5.30	5.38	21.20
2008-09	SB-11	Raigad	05	18.00	17.20	14.60	0.80	2.60	4.44
2008-09	Konkan Gaurav	Ratnagiri	12	20.00	17.00	13.79	3.00	3.21	15.00
2009-10	TAG-24	Sindhudurg	10	22.00	21.65	16.00	0.35	5.65	1.59
2009-10	TAG-24	Thane	15	22.00	21.85	16.10	0.15	5.75	0.68
2009-10	Konkan Trombay Tapora	Raigad	10	22.00	19.40	13.80	2.60	5.60	11.82
		Average	**100**	**22.30**	**19.75**	**14.95**	**2.55**	**4.80**	**11.04**

Data presented in Table 1 showed that, in *kharif* groundnut, the technology gap was highest in case of variety TG-26 (7.32 q/ha) and lowest in variety Konkan Gaurav (5.17 q/ha). The extension gap was highest in TG-26 variety (4.90 q/ha) and lowest in variety Konkan Gaurav (2.53 q/ha). Regarding TG-26 variety it was observed that the technology gap was highest (7.32 q/ha) in Sindhudurg, whereas, extension gap was highest (4.90 q/ha) in Ratnagiri district.

It was observed from Table 2, that in *rabi-summer* groundnut the technology gap was highest (6.00 q/ha) in case of variety TG-26 and lowest (0.15 q/ha) in variety TAG-24. Regarding variety TAG-24, it is seen that the technology gap was less than 3q/ha in Thane and Sindhudurg district which is very much satisfactory. Same kind of result was obtained in case of variety SB-11 from Raigad district. In case of performance of variety TG-26 in Ratnagiri and Raigad district, technology gap was 6.00 q/ha and 5.30 q/ha was observed respectively. More values of technology gap in case of variety Konkan Gaurav (3.00 q/ha) and Konkan Trombay Tapora (2.60 q/ha) emphasize the need to conduct front line demonstrations more critically.

The extension gap was highest (7.20 q/ha) in variety TG-26 and lowest (2.60 q/ha) in variety SB-11 followed by variety Konkan gaurav (3.21 q/ha). At almost all the locations the extension gap of different groundnut varieties was between 2.60 q/ha to 7.20 q/ha which means there is wide gap in adoption of improved technology.

The existence of extension gap was because of the demonstrator farmers in their local plot failed to adopt recommendations for important practices like application of phosphate soulbalizing bacteria, lime sulphate, proper fertilizer dose, use of control measures for pests like leaf eating caterpillar and diseases like fungal neck rot, damping off and tikka. More over they did not follow seed treatment. The findings are in line with the findings of Patil and Kunal (1998) and Das *et al*. (2008).

A perusal of Table 3 enlightens the fact that, the technology gap was observed minimum i.e. 0.61 q/ha and 0.70 q/ha in niger variety IGP-76 and Phule karala respectively in the location Thane district. However, technology gap of these varieties was observed maximum in Ratnagiri district. This may be due to the soil fertility and weather conditions. The extension gap was ranged 0.75 q/ha to 1.60 q/ha in all the locations which emphasized the need to educate the farmers in adoption of improved technologies to narrow these extension gaps. The findings are in line with the findings of Goswami *et al*. (1996).

It was observed from Table 4 that, the technology gap was lowest (2.86 q/ha) in sunflower variety Pioneear-64599 and highest (4.20 q/ha) in variety Kargil 413. Further, it is seen that there exist a wide gap between potential yield and demonstration yield. The reason accountable for this is the non-availability of location specific varieties and non-adoption of

Table 3
Technological and Extension yield gap and Technology Index for demonstrated niger crop technology

Year	*Variety used*	*Location (District)*	*No. of Demo*	*Yield (q/ha) Potential*	*Demo.*	*Local check*	*Techno-logy gap (q/ha)*	*Extension gap (q/ha)*	*Technology index (%)*
2008-09	IGP- 76	Ratnagiri	13	4.75	2.75	2.00	2.00	0.75	42.11
2008-09	IGP- 76	Thane	15	4.75	4.14	2.70	0.61	1.44	12.84
2009-10	Phule karala	Ratnagiri	12	5.00	3.18	2.15	1.82	1.03	36.40
2009-10	Phule karala	Thane	10	5.00	4.30	2.70	0.70	1.60	14.00
		Average	**50**	**4.88**	**3.59**	**2.39**	**1.28**	**1.21**	**26.34**

Table 4
Technological and Extension Yield gap and Technology Index for demonstrated Sunflower crop technology

Year	*Variety used*	*Location (District)*	*No. of Demo*	*Yield (q/ha) Potential*	*Demo.*	*Local check*	*Techno-logy gap (q/ha)*	*Extension gap (q/ha)*	*Technology index (%)*
2008-09	Kargil 413	Sindhudurg	10	15.00	12.00	7.90	3.00	4.10	20.00
2008-09	Kargil 413	Ratnagiri	10	15.00	10.80	7.30	4.20	3.50	28.00
2009-10	Pioneer 64599	Sindhudurg	10	15.00	12.14	8.10	2.86	4.04	19.07
2009-10	Suryakiran	Ratnagiri	10	15.00	11.40	8.00	3.60	3.40	24.00
2009-10	Morden	Raigad	10	12.00	8.10	6.15	3.90	1.95	32.50
		Average	**50**	**14.40**	**10.89**	**7.49**	**3.51**	**3.40**	**24.71**

certain recommended package of practices like Azospirillum culture, proper intercultural operations and water management even on the demonstration fields.

The extension gap was highest (4.10q/ha) in case of variety Kargil 413 demonstrated in Sindhudurg district while lowest (1.95 q/ha) in variety Morden demonstrated in Raigad district. More or less for all the sunflower varieties the extension gap was high.

Technology Index

For ascertaining feasibility of evolved oilseed technology at the farmer's field, technology index was calculated. The criteria is lower the value of technology index more is the feasibility of the technology. Technology index was observed highest (29.28 per cent) in *kharif* groundnut (Table 1) variety TG-26 followed by Konkan Gaurav(25.85 per cent), TAG-24 (23.91 per cent) and TG-26 (21.20 per cent) from Ratnagiri location. Hence, according to criterion, TG-26 was found best in *kharif* season at Ratnagiri location.

In *rabi-summer* groundnut (Table 2) the technology index was highest (24.00 per cent) in variety TG-26 in Ratnagiri district followed by variety TG-26 (21.20 per cent) and Konkan Gaurav (15.00 per cent) in location Raigad. The lowest i.e. 0.68 per cent and 1.59 per cent technology index was observed in variety TAG-24, cultivated in Thane and Sindhudurg district, respectively. This might be due to good climatic conditions and proper implementation of demonstration programme. Further, lower technology index values were seen in variety SB-11 (4.44 per cent), TG-26 (11.20 per cent) and Konkan Trombay Tapora (11.82 per cent). Hence, according to the criterion, in *rabi-summer* groundnut variety TAG-24 is best.

It was observed from Table 3 that, the technology index was highest in niger variety IGP-76 (42.11 per cent) and Phule Karala (36.40 per cent) in Ratnagiri. However, both varieties have lowest i.e.12.84 and 14.00 per cent technology index in Thane district. Hence, according to criterion variety IGP-76 and Phule Karala performed best in Thane district. The possible reason that could be attributed to the high feasibility of niger production technology was that the participant farmers were given opportunity to interact with the scientist and they were made to adopt recommended practices and skills during the process of demonstration.

Table 4 indicating the technology index of sunflower variety demonstration in three districts resulted that technology index was highest in variety Morden (32.50 per cent) followed by Kargil-413 (28.00 per cent) and Suryakiran (24.00 per cent). The technology index was lowest (19.07 per cent) in case of variety Pioneer-64599 which is more feasible than any other varieties. As the technology index of other varieties was observed more than 20.00 per cent, this indicates that a wide gap exist between the technology evolved at Research Station and farmers field. The findings are supported by the findings of Sharma and Sharma(2004).

Impact

The information regarding the impact of front line demonstrations on improvement of productivity of selected oilseed crops is presented in Table 5.

Table 5
Impact of Front Line Demonstrations on improvement of productivity of selected oilseeds

Sr. No.	*Crops*	*Area (ha.)*	*No. of Demonstra-tions*	*Average yield (q/ha)*		*% increase in yield over local*
				Demo.	*local*	
1.	*Kharif* Groundnut	11.80	50	17.23	13.12	31.32
2.	*Rabi- summer* Groundnut	30.20	100	19.75	14.94	32.19
3.	Niger	08.10	50	3.59	2.38	50.84
4.	Sunflower	07.50	50	10.88	7.49	45.26

The crop wise common economic impact of front line demonstrations on oilseed was worked out by considering the yield data of front line demonstrations and local check plot. The average area under front line demonstration programme was 0.23 ha in *kharif* groundnut, 0.30 ha in *rabi-summer* groundnut, 0.16 ha in niger and 0.15 ha in sunflower. In Konkan region, the average land holding is small to medium and also the fragmentation of ancestral land from generation to generation has lead to smaller size of land holding available for cultivation of crops. Hence, optimum size of area for FLDs is not observed.

The data indicated in Table 1 revealed that, there was 50.84 per cent increase in yield over local check in niger followed by 45.26 per cent in sunflower. In case of *kharif* groundnut and *rabi-summer* groundnut

the increase in yield of demonstration plot was 31.32 per cent and 32.19 per cent over local check, respectively due to implementation of front line demonstration programme.

The per cent increase in yield was higher in niger (50.84 per cent) followed by sunflower (45.26 per cent), *rabi-summer* groundnut(32.90 per cent) and *kharif* groundnut (31.32 per cent). The key inputs which make the difference in the yield of demonstration and local check plot were seed treatment, spacing, manures and fertilizers and plant protection measures.

In this study the influence of the front line demonstration was also observed on the productivity of oilseed due to adoption of improved recommended practices. The FLD programme was effective in changing knowledge, attitude and skill of demonstrator farmers regarding improved recommended practices of oilseeds during adoption. This also improved the relationship between farmers, extension workers and scientists and built confidence between them.

Economic impact of demonstrated oilseed technology

In this study, the composite mean crop wise economic impact of demonstrated oilseed crop technology was worked out by calculating average total costs, gross return, net return and B:C ratio of demonstration and local check plot. Cost of oilseed crop cultivation in the present study was attempted by computing per hectare cost. Total operational cost was worked out by total sum of expenditures of land preparation, seeds, manures and fertilizers, plant protection measures and labour component.

The results in Table 6 shows that, in *kharif* groundnut in case of demonstration plot total average cost per hectare was ₹ 24450/-. gross return ₹ 36183/- and B: C ratio 1.48, whereas in case of local check plot total average cost per hectare was ₹ 23960/-. gross return ₹ 27552/- and B: C ratio 1.15 was found. In *rabi-summer* groundnut it was found that demonstration plot total average cost per hectare was ₹ 25400/-. gross return ₹ 41475/- and B: C ratio 1.63, whereas in case of local check plot total average cost per hectare was ₹ 24320/-. gross return ₹ 31374/- and B: C ratio 1.29 was recorded.

With regard to niger crop, demonstration plot total average cost per hectare was ₹ 9970/-, gross return ₹ 16155/- and B:C ratio 1.62, whereas in case of local check plot total average cost per hectare was ₹ 8500/-, gross return ₹ 10710/- and B:C ratio 1.26 was found. In sunflower crop demonstration plot total average cost per hectare was ₹ 14460/-, gross return ₹ 20670/- and B:C ratio 1.43, whereas in case of local check plot total average cost per hectare was ₹ 12590/-, gross return ₹ 14231/- and B:C ratio 1.13.

Table 6
Total costs, returns and comparison of B:C ratio of demonstrated and local check plot

Sr. No.	*Crops*	*Total cost (₹)*		*Gross return(₹)*		*Net return (₹)*		*B:C Ratio*	
		Demo	*Local*	*Demo*	*Local*	*Demo*	*Local*	*Demo*	*Local*
1.	Kharif Groundnut	24450	23960	36183	27552	11733	3592	1.48	1.15
2.	Rabi- summer Groundnut	25400	24320	41475	31374	16075	7054	1.63	1.29
3.	Niger	9970	8500	16155	10710	6185	2210	1.62	1.26
4.	Sunflower	14460	12590	20670	14231	6210	1641	1.43	1.13

Total expenditure in the cultivation of *rabi-summer* groundnut was maximum than *kharif* groundnut, sunflower and niger with same trend of increase in net return. The comparative profitability of different oilseed crops in demonstrated plots shows that the highest benefit:cost ratio was obtained in *rabi-summer* groundnut (1.63) followed by niger (1.62), *kharif* groundnut (1.48) and sunflower (1.43). These findings are supported by the findings of Sharma and Sharma (2004) and Trilochan *et al.* (2007).

It was seen that, with respect to cost of cultivation nearly same amount have spent in demonstration and local check plot. It might be due to the fact that, the demonstrator farmers were not much aware about improved technology of crop cultivation before taking part in demonstration. The increase in net return from demonstration plot was much more than from local check plot was observed. The probable reason might be that, during the front line demonstration period, the demonstrator farmers undergone various method demonstrations, training programmes and gained more knowledge about new technological skills to carry out the farm operations.

It is clear from the results that, the average B:C ratio of demonstration plot was higher than local check plot in case of all the oilseed crops. The factors

responsible for low B: C ratio in local check plot was because of adopting traditional methods of cultivation i.e. no proper seed treatment, improper spacing, imbalance use of manures and fertilizers and not following plant protection measures. However, the high B:C ratio in demonstration plot may be due to the gain in knowledge of recommended practices of oilseed crops during the extension contact, extension participation and practicing it in the demonstration field under the close supervision of the scientists.

CONCLUSION

The data showed that, the technology gap was more except groundnut variety SB-11 and TAG-24. The lowest technology index was observed in variety TAG-24. Thus, it can be concluded that through FLD programme variety SB-11 and variety TAG-24 was found best for cultivation in Konkan region. Further, nearly all the niger and sunflower varieties except few, the extension gaps was higher than the technology gaps resulting into low adoption of technology on farmers field. High technology and extension gap reveals that, the full potential of the crops on farm thus remains untapped even though there is technology explosion in this fast changing world.

It was concluded that there is direct impact on productivity due to adoption of front line demonstration programme on oilseed technology. The per cent increase in yield was higher in niger followed by sunflower, *rabi-summer* groundnut and *kharif* groundnut. The highest benefit:cost ratio was obtained in *rabi-summer* groundnut followed by niger, *kharif* groundnut and sunflower. It means gain in knowledge by timely advice may create impact on the farmer's knowledge and adoption of recommended practices of oilseed crops to obtain good yield. The average B:C ratio of demonstration plot was higher than local check plot in case of all the oilseed crops. The factors responsible for low B:C ratio in local check plot was because of adopting traditional methods of cultivation i.e. no proper seed treatment, improper spacing, imbalance use of manures and fertilizers and not following recommended plant protection measures.

REFERENCES

Das, J. K., Goswami, K. K., Mazumdar, G. and Bhattacharya, D. (2008), "Diffusion and adoption of mustard production technology" *J. Interacad.* 12(4) : 563-567.

Goswami, S. N. ; Choudhary, A. N. and Khan, A. K. (1996), "Yield gap analysis of major Oilseed of Nagaland". *Journal of Hill Research* 9 (1): 85-88.

Patil, S. M. and Kunal, L. B. (1998), "Yield gap and constraints in groundnut production in Karnataka". *Karnataka J. Agric. Sci.,* 11(2) : 432-435

Sharma, R. N and Sharma, K.C. (2004), "Evaluation of Front Line Demonstration trials on oilseeds in barren district of Rajasthan" *Madhya J. of Extn. Edn.* Vol.VII.2004.72-75.

Trilochan Singh, Vyas, M.D. , Arvind Saxena and Anil Jain (2007), "Impact of New Technologies on Soyabean at Farmers' Field". *Indian Res. J. Ext. Edn.* 7 (1) : 39-40.