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Impact of front line demonstration on the yield of niger in western Ghat Zone of Maharashtra

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Abstract
The present study was conducted to investigation the costs involved and returns obtained from the cultivation of niger and compare the performance of niger variety IGPN 2004-1 and IGPN 8004 with the local variety of farmer in the district Nashik. The demonstration were conducted by Zonal Agricultural Research Station, Igatpuri at the farmers fields of many villages during the *kharif* season from 2014-15 to 2018-19 in district Nashik of Maharashtra. The average yield of FLD was 297.40 Kg/ha as compared to farmers practices 192.20 Kg/ha. The average yield increased 56.40 per cent over farmer's practices during the five years. The result indicated that the front line demonstration has given a good impact over the farming community of the district about 428 Kg/ha. The farmers of the district have been motivated by the improved agriculture technologies applied in the FLD these findings are in corroboration with the finding of many others.

Keywords: Front line demonstration, impact, niger, yield

Introduction
Niger (*Guizotia abyssinica* (L.f.) Cass) is one of the important minor oil seed crops of India. Its cultivation originated in the Ethiopian highlands and has spread to other parts of Ethiopia. Common names include noog/nug, niger, nyger, nyjer, or niger seed, ramtil, ramtilla, inga seed, and blackseed. Niger though a native of Tropical Africa, is wide spread and extensively cultivated in India since long. It has been reported that this crop is the only cultivated member of the taxon Guizotia. This crop is grown mainly for its oil and seed. The niger seed contains about 35 to 40 percent oil with fatty acid composition of 75-80% linoleic acid, 7-8% palmitic and stearic acids and 5-8% oleic acid. (Getinet and Teklewold, 1995) [3]. The Indian types contain 25% oleic and 55% linoleic acids (Nasirullah *et al*.,1982) [6]. As because of niger can be grown with minimum agro inputs, it is considered to be a crop resources poor farmers particularly in developing countries like India. It is grown in the states of Maharashtra, Madhya Pradesh, Chattisgarh, Orissa and to a lesser extent in Karnataka, Bihar, Jharkhand, Gujarat and Andhra Pradesh. In Maharashtra, it is grown on an area of 0.141 lakh ha with the production of 0.023 lakh MT and productivity is 165 kg/ha. The main objective of FLD was to show the worth or value of the technology. Hence, this is a challenging task for the scientist and farmers under such condition it is quite imperative that reasons for the technological gap in niger should be identified and studied critically in order to face the existing challenge of low productivity. In this context the present study has been undertaken to evaluate the difference between demonstrated technologies vis a vis practices followed by the local farmers in niger crop.

Materials and Methods
The present study was conducted to investigate the costs involved and returns obtained from the cultivation of niger and compare the performance of niger variety IGPN 2004-1 and IGPN 8004 with the local variety of farmer in the district of Nashik. The demonstration were conducted by Zonal Agricultural Research Station at the farmers fields during the *kharif* season from 2014-15 to 2018-19 in district Nashik of Maharashtra state. During five years of study, an area of 42 ha. was covered under front line demonstration with active participation of total 105 farmers (Table 1).
Before conducting FLD's a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspects of cultivation. Niger variety IGPN 2004-1 and IGPN 8004 was demonstrated on total area of 42 ha. Similarly, equal numbers of control plots were also laid. In FLD's emphasis was given on use of improved agronomical practices including proper seed rate, seed treatment, balanced fertilizer and plant

protection etc. the data were collected from both FLD plots as well as plots of farmers using their traditional practices. Finally the extension gap, technology gap along with the benefit cost ratio were worked out. The technology gap, extension gap and technology index were calculated using the following formula.

Extension gap = Demonstration yield - farmers practices yield.

Technology gap = Potential yield of variety – Demonstration yield.

Technology index (%) = Technology gap x 100/Potential yield.

B: C ratio = Net income (Rs. / ha) / cost of cultivation (Rs. / ha)

% increased over farmers practices = Improved practices – Farmers practices / farmers practices x 100

Results and Discussion

The average yield of FLD was 297.40 Kg/ha as compared to farmers practices 192.20 Kg/ha. The average yield increased 56.40 per cent over farmers practices during the five years. The result indicated that the front line demonstration has given a good impact over the farming community of the district about 428 Kg/ha. The average highest yield has been recorded during 2018-19 year, while the average yield was 297 Kg/ha in farmers practices during the year 2018-19. The farmers of the district have been motivated by the improved agriculture technologies applied in the FLD. These findings are in corroboration with the findings of Romade *et al*. (2019) [7], Dalei *et al* (2016) [2], Kushare and Sahane (2011) [5].

Extension gap

The average extension gap 105.20 Kg/ha has been found during this period while the average highest extension gap 131 Kg/ha was recorded during the year 2018-19. This emphasized the need to educate the farmers through different means for the enhancement of adoption of improved technologies to reverse this trend of wide extension gap use of innovation production technologies with high yielding varieties will subsequently change this alarming trend to extension gap.

The results of technologies will ultimate lead to the discussion of farmers to discontinue the old technology to adopt the new technology.

Technology gap

The average technology gap was 202.60 Kg/ha during the five years, while it was highest 281 Kg/ha during the year 2014-15. The minimum technology gap has been recorded 72 Kg/ha during the year 2018-19.

The observed technology gap may be attributed dissimilarly in soil fertility status, rainfall distribution, disease and pest attack as well as the change in the location of demonstration plots every year. The differences in technology gap during different years could be due to more feasibility of recommended technologies during different years.

Technology index

The technology index for all the demonstrations during different year were in accordance with technology gap. The highest technology index per cent of 56.20 was recorded in the year 2014-15 and the lowest was observed in the year 2018-19 which is 14.40 per cent. The technology index shows the feasibility of the evolved technology at the farmers fields and the lower the value of technology index more in the feasibility of the technology.

Economic analysis

The input and output prices of commodities prevailed during the demonstration were taken for calculating gross return, cost of cultivation, NMR and benefit cost ration. Use of pricy seeds for crops sowing date, sowing method, seed treatment, seed rate, recommended dose of fertilizer, proper pest management etc, all of these are the main reasons for high cost of cultivation in demonstration fields than local check. Therefore, the average cost of cultivation of five years increased in demonstration practices 9344 Rs/ha as compared to farmer practices 6786 Rs/ha (Table 4).

Table 1: Detail of Front Line Demonstration conducted during 2014-2019

S. No	Year	No. of farmer	Conducted FLD	Area (ha.)
1	2014-15	20	20	8
2	2015-16	25	25	10
3	2016-17	25	25	10
4	2017-18	15	15	6
5	2018-19	20	20	8
Total		105	105	42

Table 2: Details of package of practices followed under FLD vs. Farmers Practices

Particular	Niger	
	Demonstration package	Farmers' practice
Improved Varieties	IGPN 2004-1 and IGPN 8004	Local (Khurasani, Karala)
Seed rate (per ha)	4 to 5 kg	7 to 8 kg
Seed treatment	Carbedenzim @2.5 g/Kg of seed, *Azotobactor/Azosperillum* @ 25g/kg of seed, Phosphate solublizing bacteria @ 25g/kg of seed	Not followed
Sowing and spacing	Wooden plough/ Seed drill, 30x10 cm	Broadcasting
Fertilizer dose and its application time	20 kg N/ha. + 20 kg P/ha. at the time of sowing and remaining 20 kg N/ha. at 30 DAS after sowing	No fertilizer use
Intercultural operation	One thinning within three weeks after sowing, one hoeing within four weeks after sowing and one hand weeding at 30 days after sowing.	Not followed
Plant protection measures	Need based application of Neem extract @ 2 ml/l to protect the crop against aphids	Not followed

Table 3: Seed yield and gap analysis of FLD's on niger at farmers field

Year	No. of FLD's	Variety	Potential yield (Kg/ha)	Demon-stration yield (Kg/ha)	Farmers Practices (kg/ha)	Increase yield (%)	Extension gap (kg)	Techno-logy gap (kg)	Techno-logy index (%)
2014-15	20	IGPN 2004-1	500	219	161	36.02	58	281	56.20
2015-16	25	IGPN 2004-1 IGPN 8004	500	287	181	58.56	106	213	42.60
2016-17	25	IGPN 2004-1 IGPN 8004	500	265	157	68.79	108	235	47.00
2017-18	15	IGPN 2004-1 IGPN 8004	500	288	165	74.55	123	212	42.40
2018-19	20	IGPN 2004-1	500	428	297	44.11	131	72	14.40
Average				297.40	192.20	56.40	105.20	202.60	40.52

Table 4: Economic analysis of demonstration plots and farmers practices in Niger

Year	Cost of cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B:C Ratio	
	IT	FP	IT	FP	IT	FP	IT	FP
2014-15	8219	6791	14092	10465	5853	3674	1.74	1.54
2015-16	12361	7945	20930	12480	8569	4335	1.69	1.57
2016-17	10343	7106	18550	10990	8207	3884	1.79	1.55
2017-18	8982	7215	20160	11550	11178	4335	1.24	1.60
2018-19	6816	4872	17126	11180	10310	6308	1.51	1.29
Mean	9344	6786	18172	11333	8823	4507	1.59	1.51

The cultivation of niger crop under improved technology gave average higher net return of Rs. 8823/ha as compared to farmers practices Rs. 4507/ha. The average B:C ratio of niger under improved technology was 1.59 as compared to 1.51 under farmers practices. Bhoite *et al.*, (2019) [4] and Ahirwar *et al.*, (2011) also reported similar results.

The above results showed that the integration of improved technology along with active participation of farmers has a positive effect in increase the seed yield and economic return of niger crop production. The suitable technology for enhancing the productivity of niger crop and need to conduct such demonstration may lead to the improvement and empowerment of farmers. The demonstration traits also enhance the relationship and confidence between farmers and ZARS scientists. The recipient farmers of FLD's also play an important role as source of information and quality seeds for wider dissemination of the improved varieties of niger for other nearby farmers. It is concluded that the FLD's programme is a successful tool in enhancing the production and productivity of niger crop through changing the knowledge, attitude and skill of farmers.

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