Environment and Ecology 36 (2) : 393—396, April—June 2018
Website: environmentandecology.com ISSN 0970-0420

Increasing the Productivity and Profitability of Linseed (*Linum usitatissimum* L.) through Front Line Demonstrations under Irrigated Agroecosystem of Madhya Pradesh

Deepak Khande, Gaurav Mahajan

Received 12 November 2017; Accepted 15 December 2017; Published on 31 December 2017

Abstract Front line demonstrations on linseed variety Kiran were conducted on farmers' fields in district Hoshangabad (Madhya Pradesh) during *rabi* 2004-05 to 2012-13. An average 36.38% higher grain yield was recorded under demonstrations over the farmers' practices. The extension gap, technology gap and technology index were observed to be 3.42 q per ha, 3.42 q per ha and 12.49%, respectively. An average additional return of Rs 7373 per ha was obtained with an additional investments of Rs 2407 per ha coupled with scientific monitoring of demonstrations and use of other non-monetary factors. On average basis, the incremental benefit: Cost ratio was found to be 3.40.

Keywords Demonstration, Economics, Gap analysis, Technology gap, Technology index.

Deepak Khande, Gaurav Mahajan*
All India Coordinated Research Project on Oilseeds, Zonal Agricultural Research Station, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Powarkheda 461110, Madhya Pradesh, India
e-mail: aicrpagrorewa@gmail.com
*Correspondence

Introduction

Oilseeds accounts for 14% of total cropped area in the country, occupying about 27.5 million ha area with a production of 24.7 million tones, this accounts for nearly 5% of the gross national product and 10% of the value of all the agricultural products. Low per hectare productivity of crop is in the country (900 kg/ha) against the world average of 1400 kg/ha in world is a matter of concern [1]. Linseed (*Linum usitatissimum* L.) is one of the important oilseed crops in India and stands next to rapeseed-mustard in winter season oilseeds with respect to area and production. Linseed accounts for about 60% of oil crops, out of the two technical bearing oil crops, viz. linseed and castor. The major causes of low productivity of linseed in Madhya Pradesh includes several biotic and a biotic stresses besides unavailability of quality seeds of improved varieties in time, non adoption of recommended production and plant protection technologies. Therefore, it is important to demonstrate the high yielding linseed varieties and their production technologies to boost linseed production. A wide gap exists between the available techniques and its actual application by the farmers which is reflected through poor yield in the farmer's fields. There is a tremendous opportunity for increasing the production and productivity of linseed crops by adopting the improved technologies. A range of linseed production technologies have been generated at agricultural universities and research stations, but the productivity of linseed is still very low due to poor transfer of technologies from research farms to

farmer's fields. To achieve the target of oilseeds production and productivity, it is necessary to concentrate efforts on scientific cultivation of linseed and conduct FLDs trials on linseed varieties that may be helpful for improving productivity of farmer's fields. To demonstrate the scientific cultivation of linseed front line demonstrations should be laid out at farmer's field. The basic objective of FLDs is to demonstrate the proven technology at farmer's field. The station had laid out demonstrations of linseed crop on farmers field under irrigated situations during *rabi* 2004-05 to 2011-12 to demonstrate the performance of recommended high yielding linseed variety with complete package of practices along with the objective to assess the performance of FLD fields with local check and finally to analyze the economics of FLDs on linseed.

Materials and Methods

Front line demonstrations on linseed variety Kiran was conducted at farmer's field in district Hoshangabad (Madhya Pradesh) during *rabi* 2004-05 to 2012-13. Soil of the district is sandy loam, low in N, low-medium in P and medium to high in K. Linseed was grown as per the recommended package and practices of the district. The crop was sown in mid-October under assured irrigated conditions and harvested in March. The FLDs were regularly monitored by the scientists of AICRP on oilseeds, from sowing to harvesting. Gap analysis and returns were calculated by using the procedure of Yadav et al. [2].

I. Extension gap = Demonstration Yield (D_1) – Farmers Practice Yield (F_1)

II. Technology gap = Potential Yield (P_1) – Demonstration Yield (D_1)

$$\text{III. Technology Index} = \frac{\text{Potential Yield } (P_1) - \text{Demonstration Yield } (D_1)}{\text{Potential Yield } (P_1)} \times 100$$

IV. Additional Return = Demonstration Return (Dr)– Farmers Practice Return (Fr)

V. Effective Gain =Additional Return (Ar) – Additional Cost (Ac)

$$\text{VI. Incremental B : C Ratio} = \frac{\text{Additional Return (Ar)}}{\text{Additional Cost (Ac)}}$$

Results and Discussion

During the period of study, a total number of 26 FLDs were conducted at farmer's field as per the allotment by ICAR, New Delhi. Out of 26 demonstrations,18 (69%) in range of 10-14 q/ha and remaining 08 (31%) were found in the high yield category i.e. more than 14 q/ha which might be attributed to variations in biotic and abiotic stresses observed across different time horizon (Table 1).

Grain yield

The increase in grain yield under demonstration over the farmer's local practices was in the range of 15 to 62%. On the average basis 36.38% yield advantage was recorded under FLD demonstrations as compared to farmers practices (FP) of linseed cultivation.

Gap analysis

An extension gap ranging from 1.8 - 4.8 q per hectare was found between FLD demonstration and farmers practices during the different time line and on average basis the extension gap was observed to be 3.42 q kg per hectare (Table 2). The extension gap was lowest (1.8 q/ha) in year 2012-13 and was highest (4.8 q/ha) in year 2004-05. Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than that in the farmers practices. Wide technology gap were observed during these years and this was lowest (1.75 q/ha) during 2012-13 and was highest (4.84 q/ha) dur-

Table 1. Details of demonstrations under different yield ranges in linseed.

Number of demonstrations conducted during 2004-05 to 2012-13		Number of demonstrations in range different yield (q/ha)		
Allotted	Conducted	< 10	10-14	>14
26	26	0 (0)	18 (69.23)	08 (30.7)

Table 2. Grain yield and gap analysis of front line demonstrations of linseed on farmer's field.

Years	Number of demonstration	Variety sown	Yield potential (kg/ha)	Yield q/ha Improved technology	Yield q/ha Farmers practice	Yield increase over farmers practice (%)	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
2004-05	2	Kiran	15.00	13.88	9.12	53.0	4.8	4.76	7.5
2005-06	1	Kiran	15.00	13.75	11.25	22.0	2.5	2.50	8.3
2006-07	3	Kiran	15.00	14.08	10.50	34.0	3.6	3.58	6.1
2007-08	3	Kiran	15.00	12.67	7.83	62.0	4.8	4.84	15.5
2009-10	4	Kiran	15.00	10.18	8.03	27.0	2.2	2.15	32.1
2010-11	5	Kiran	15.00	14.45	10.65	37.0	3.8	3.80	3.7
2011-12	4	Kiran	15.00	13.00	9.00	41.0	4.0	4.00	13.3
2012-13	4	Kiran	15.00	13.00	11.25	15.0	1.8	1.75	13.3
Average	26		15.00	13.13	9.70	36.38	3.42	3.42	12.49

ing 2007-08. On average basis the technology gap of all the 26 demonstrations was found to be 3.42 kg per hectare. The difference in technology gap during different years could be due to differential feasibility of recommended technologies during different years. Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. Higher technology index reflected the inadequacy of technology and or insufficient extension services for transfer of technology.

Economic analysis

Different variables like seed, fertilizers, herbicides and pesticides were considered as cash inputs for the FLD demonstrations as well as for farmers practice. It is observed that an additional investment of Rs 2407 per ha was made under FLD demonstrations. Economic returns was observed to be a function of grain yield and Minimum Support Price (MSP) or sale price which varied along different years. A maximum return of Rs 10136 per hectare during the year 2007-08 was obtained due to higher grain yield. The higher additional returns under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit: Cost ratio (IBCR) were 1.62 and 7.13 in 2005-06 and 2010-11, respectively (Table 3) which depends on grain yield and MSP or sale price. The gap observed may be attributing to the dissimilarity in soil fertility status and weather conditions. Mukharjee [3] have also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. The front line demonstration on linseed revealed 36% increase in yield over local check. This increase was with an extra expenditure of Rs 2407/ha which is very less and even small and marginal farmers could also afford. Thus it is not the cost that deters the

Table 3. Economic analysis of front line demonstrations of linseed on farmer's field.

Years	Cost of cultivation Improved technology	Cost of cultivation Farmers practice	Additional cost in demonstration	Sale price of grain (Rs/q)	Gross return (Rs/ha) Improved technology	Gross return (Rs/ha) Farmers practice	Additional NER (Rs/ha)	Effective gain (Rs/ha)	Incremental B:C ratio (IBCR)
2004-05	9446	6744	2702	1927	26750	16425	7598	4896	2.81
2005-06	8541	6635	1906	2000	27500	22500	3094	1188	1.62
2006-07	8374	5577	2797	1800	25350	15750	6803	4006	2.43
2007-08	10272	6483	3789	2549	32300	18375	10136	6347	2.68
2009-10	10134	8040	2094	3053	31075	23113	5868	3774	2.80
2010-11	10363	9194	1169	2500	36125	26625	8331	7162	7.13
2011-12	14063	10893	3170	3865	50250	36000	9444	6274	2.98
2012-13	13722	12094	1628	3534	45938	36600	7709	6081	4.74
Average	10614	8208	2407	2654	34411	24424	7373	4966	3.40

farmers from adoption of latest technology but ignorance is the primary reason. It is quite appropriate to call such yield gap as extension gap. The extension gap was found to be 3.42 q/ha. The average IBCR (3.40) is sufficiently high to motivate the farmers to adopt the technology. Mahajan [4] was of the same opinion. Therefore, FLD program was effective in changing attitude, skill and knowledge of farmers towards improved/recommended practices of linseed cultivation. This also led to improvement in the relationship between farmers and scientists and built confidence between them. The FLD demonstration farmers acted as primary source of information about the improved practices of linseed cultivation.They also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of front line demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community. This will help in the removal of the cross-sectional barriers among farming community.

References

1. Piri I, Sharma SN (2006) Effect of levels and sources of sulfur on yield attributes, yield and quality of Indian mustard *(Brassica juncea)*. Ind J Agron 51 : 217—220.
2. Yadav DB, Kamboj BK, Garg RB (2004) Increasing the productivity and profitability of sunflower through front line demonstrations in irrigated agro ecosystem of eastern Haryana. Hary J Agron 20 : 33—35.
3. Mukharjee N (2003) Participatory learning and action. Concept Publ Company, New Delhi, India, pp 63—65.
4. Mahajan G (2017) Cost and income structure of sweet corn (*Zea mays Saccharata* Sturt.) cultivation as influenced by different agronomic inputs. Econ Aff 62 : 97—102.