

## Performance of frontline demonstration on productivity and profitability of Utera cropping of linseed (*Linum UsitatissimumusitatissimumL.*) under rainfed ~~condition~~ conditions in tribal district Balaghat of Madhya Pradesh

### ABSTRACT

The study was carried out by the College of Agriculture Waraseoni (Balaghat), Madhya Pradesh in the agroclimatic zone of the Chhattisgarh plains to know the yield gaps between improved package and practices under front-line demonstration (FLD) and farmer's practice (FP) of Utera cropping of Linseed under rainfed condition. Front Line Demonstrations on Linseed were conducted on farmer's fields during the Rabi season of the year 2016-17 to demonstrate the impact of enriched agro-techniques on production and economic benefits under rainfed conditions. FLD's were conducted in 11.20 ha with the active involvement of 28 farmers and scientific staff of the Institution. According to analysis of data the highest grain yield was obtained in demonstrated plots with an average of 7.25 q/ha as compared to local check with an average of 4.94 q/ha. ~~An-The~~ average mean of the extension gap, technology gap and technology index ~~were-was~~ calculated as 2.31q/ha, 2.75q/ha, and 27.53% respectively. Adoption of the improved package of practices in Linseed cultivation recorded average higher IBCR ratio (2.99) as compared to Farmers Practice during the period of study. Thus, the productivity of Linseed could be increased with the adoption of the recommended improved package of practices. The study resulted in satisfying the farming community for higher productivity and returns.

**Keywords:** Front line demonstration, Linseed, ~~T~~ technology gap, ~~E~~ extension gap, ~~Y~~ yield.

### Introduction:

Linseed (*Linum usitatissimumL.*) is one of the oldest cultivated plants in the world [1]. It belongs to the family Linaceae and the genus Linum. Linseed is an industrial oilseed crop. A well-distributed rainfall of 450 to 500 mm is sufficient to grow a good crop of linseed, hence fit well in the rainfed cropping system. It is tolerance to biotic and abiotic stresses, which makes it suitable for a wide range of tropical, sub-tropical and temperate regions. It is a dual-purpose crop, and is grown for seeds and fibre [2]-which is used for the manufacture of linen. The oil content of the seed varies from 33-47%. Linseed oil is an excellent drying oil used in manufacturing paints and varnishes, oilcloth, waterproof fabrics and linoleum and as edible oil in some areas. Linseed-cake is a very good manure and animal

feed. Linseed is used in making paper and plastics. A well-distributed rainfall of 450 to 500 mm is sufficient to grow good crop of linseed, hence fit well in the rainfed cropping system. Linseed (*Linum usitatissimum* L.) belongs to the family Linaceae and the genus Linum. Linseed is basically an industrial oilseed crop and its each and every part is important with commercial and medicinal use. It is tolerance to biotic and abiotic stresses that is characteristic of this crop. Because of this property the cultivation of linseed is prevailing in wide range of tropical, sub-tropical and temperate regions. Linseed is an important crop grown both for its seed as well as fibre which is used for the manufacture of linen.

#### The flax seed contain

Linseeds are an excellent source of high level of dietary fibres and high amount amounts of micronutrients. It also contains omega-3 fatty acids (*linoleic acid*) that make it edible and it is also useful for heart patients. On a very small scale, the seed is directly used for edible purposes and about 20% of the total oil is used and remaining 80% of the oil goes to industries for the manufacture of paints, varnishes and printing ink, oil cloths, soap and water-proof fabrics. The oil cake is the most valuable feeding cake for animals, it contains 36% protein and 85% of it is digestible fibre. The oil cake is also used as manure; it contains 5% nitrogen (N), 1.4% phosphorus (P<sub>2</sub>O<sub>5</sub>) and 1.8% potassium (K<sub>2</sub>O) [3].

In India, Linseed grown is grown on a 174.87 thousand Hectare area and produces 111.36 thousand Tonnes with the productivity of 637 kg/ha. However, in Madhya Pradesh it cultivated only on only 47.00 thousand Hectare area is used for linseed cultivation that contributes and contributes 36.80 thousand Tonnes with a productivity of 783 kg/ha. Linseed is an important Rabi oilseed crop of the rainfed season of Balaghat district of Madhya Pradesh grown on an area of 6015 Hectare hectares and produced producing 2346 Tonnes with productivity of 390 kg/ha [4].

The productivity of oilseed in the district is low as compared to the national average mainly due to poor crop management practices ultimately and inadequate availability of quality seed seeds of improved Linseed varieties and other inputs. To increase the productivity of linseed in the Balaghat district the an inadequate and balance supply of plant nutrients along with high-yielding varieties is of critical importance. Demonstration of promising technologies on farmer's fields is an effective method of extension. Knowledge and skills gained through the demonstration plots can be easily transferred from farmer to farmer. The productivity of linseed per unit area could be increased by adopting recommended scientific and sustainable management practices using a suitable high-yielding

cultivar. Taking into account the above considerations, Frontline Demonstrations (FLDs) were carried out ~~in a systematic manner~~ systematically on ~~farmer's farmers' field fields~~ to show the worth of new varieties and application of balance nutrients and ~~convincing~~ convince farmers to adopt improved production management for enhancing the productivity of Linseed.

#### Material and Methods:

The Balaghat district of Madhya Pradesh is located in the extreme South-West of the ~~Madhya Pradesh~~ state and occupies the southeastern portion of the Satpura Range and the upper valley of the Wainganga River. The district extends from 21°19' ~~to~~ to 22°24' North latitude and 79°31' to 81°3' East longitude with quadrangle shape. The Balaghat district is characterized by varying soil types ranging from ~~a~~ mixed red and yellow to shallow and moderately deep soil strata with low water holding capacity. Soils of the Balaghat district are poor in available nitrogen and phosphorous. However, medium to high Potassium is available with a pH range of 6.4 to 7.2. The climate of the zone is typically semi-humid and sub-tropical with hot dry summers and cold winters. The mean minimum temperature of the zone varies from 16° to 30° C (June to Nov.) at Balaghat with an average annual rainfall of 1250 mm. The field crops of the district in Rabi are rice, wheat, chickpea, ~~teora~~, urad, moong, mustard, linseed[5].

Comment [NB1]: Write English

Comment [NB2]: Not needed

The constraints in production were identified through participatory approach such as farmer's meetings, training programmes and field diagnostic visits during crop growth period. Low yield of Linseed was conceived due to lack of suitable variety of Linseed, imbalance use of fertilizers, drought, infestation of weeds and improper crop geometry. Based on the farmer's problems, The College of Agriculture, Waraseoni (Balaghat) conducted FLD's on Linseed during season of Rabi 2016-17 by Utera sowing method on varieties JLS-27 (High Omega-3 content, moderately resistant to powdery mildew and bud fly), Indira-32 (Erect plant, Blue flower, brown seeded, medium size) and Kartika (moderately resistant to rust, wilt & Alternaria blight and resistant to Powdery mildew)[6] under Rainfed ecosystem at Waraseoni Block of Balaghat District of Madhya Pradesh (Table 1).

Comment [NB3]: Should be moved in discussion part.

In Utera condition, sowing of crop was done before the harvesting of preceding crop, in our case, crops were grown in rice field, on other hand rainfed crop grown in rainfed situation, means totally depend on rainfall and irrigated condition, hence they need irrigation only in their critical stage. In India the area of linseed occupied under rainfed is 63% and

Utera 25%. Utera is the most traditional practices followed in rice fields where sowing by broadcasting linseed in standing rice fields just before 15 to 20 days of rice harvest when last irrigation is given. During such time the field were wet. Linseed is mostly preferred for Utera because of mucilaginous seed coat which does not stick on rice plant [7].

The area under each demonstration was 0.4 ha. The farmers selected for demonstrations were from different social background having rice area ranging from 2.5 to 5 acres.

Comment [NB4]: Not needed here

**Table 1:** Front line demonstration and carrying out site.

Year	Variety	Check	No. of FLD	Area (ha)	Village	Block
2016-17	JLS-27 Indira-32 Kartika	Local	28	11.2(0.4ha/FLD)	Kope	Waraseoni

To manage the identified problems, JLS-27, Indira-32 and Kartika varieties seeds were provided to the farmers as critical inputs and ~~scientific~~ scientifically recommended technologies (Table 2) were followed as an intervention during the course ~~offront of front~~ line demonstration ~~programme~~ program.

**Table 2:** Technological intervention and farmer's practices under FLD.

Particulars	Technological intervention	Farmers practices
Farming Situation	Rainfed	Rainfed
Variety	JLS-27, Indira-32 and Kartika	Local
Seed rate (kg/ha)	25	30-35
Seed treatment	Carbendazim 12% + Mancozeb 63% (2g/Kg)	NO
Time of sowing	15 <sup>th</sup> to 25 <sup>th</sup> October	15 <sup>th</sup> to 25 <sup>th</sup> October
Sowing Method	Utera	Utera
Fertilizer (NPK) Kg/Ha	40:25:00	Nil or 30:00:00
Weed management	Pendimethalin 30 EC (2.5 lt/ha) One hand weeding at 30-35 days after sowing	One hand weeding at 30-35 days after sowing
Insects	Pod Fly: Profenofos 50% EC (1 lt/ha)	Nil
Diseases	Powdery mildew: Hexaconazole(750ml/ha)	Nil
Harvesting	5 <sup>th</sup> to 15 <sup>th</sup> March	1 <sup>st</sup> to 10 <sup>th</sup> March

The demonstrations on farmer's fields were regularly monitored from sowing to harvesting. In case of local check (control plots), existing farmers' practices were followed by the farmers. Well before conducting the demonstrations, a training programme

was organized for the selected farmers of the respective villages for the season to impart the technological knowledge of Linseed production techniques. All other steps like site selection, the layout of demonstrations, farmers' participation etc. were followed. The grain yield of demonstrations as well as farmers' practice (local check) were recorded and analysed according to different parameters. The details of these parameters are as:

$$\text{Extension gap} = \text{Demonstration yield} - \text{Farmer's yield}$$

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

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

$$\text{Additional Cost} = \text{Demonstration cost of cultivation} - \text{Farmer's cost of cultivation}$$

$$\text{Additional Return} = \text{Demonstration return} - \text{Farmer's return}$$

$$\text{Effective Gain} = \text{Additional return} - \text{Additional cost}$$

$$\text{Increment B: C ratio} = \frac{\text{Additional return}}{\text{Additional cost}}$$

## Result and Discussion:

**Comment [NB5]:** A few lines about the results of the experiment should be written here.

**Table 3:** Gap in grain yield production of Linseed varieties under FLDs.

Season-Year variety	Potential Yield (q/ha)	Demonstration Yield (q/ha)	Farmer's practice Yield (q/ha)	Increase over Farmer's practices (%)	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
Rabi -2016-17 JLS-27	10.00	7.49	5.14	45.72	2.35	2.51	25.10
Rabi-2016-17 Indira-32	10.00	7.16	4.90	46.12	2.26	2.84	28.40
Rabi-2016-17 Kartika	10.00	7.09	4.78	48.33	2.31	2.91	29.10
<b>Average</b>	10.00	7.25	4.94	46.72	2.31	2.75	27.53

**Grain yield:** The increase in grain yield under demonstration was 45.72-48.33% than farmers' local practices. On the average basis, 46.42% yield advantage was recorded under demonstrations carried out without with improved cultivation technology as compared to farmer's traditional way of linseed cultivation.

**Gap analysis:** An extension gap of 2.26-2.35 q/ha was found between demonstrated technology and farmer's practices during the year and on an average basis the extension gap was 2.31 q/ha (Table 3). The extension gap was lowest at 2.26 q/ha for Indira-32 and was highest at 2.35 q/ha for JLS-27 during *Rabi* 2016-17. Such a gap might be attributed to the adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmer's practices. Wide-A wide technology gap was observed during the year and this was lowest at 2.51 q/ha for JLS-27 and was highest at 2.91 q/ha for Kartika during *Rabi* 2016-17. On an average basis, the technology gap of a total of 28 demonstrations was found as 2.75 q/ha. The difference in technology gap could be due to more feasibility of recommended technologies. Similarly, the technology index for all the demonstrations were in accordance with technology gap. Higher technology index reflected the inadequate provision of technology for transferring to farmers and insufficient extension services for transfer of technology. Technology—The technology index shows the feasibility of the variety at the farmer's field. The lower the value of the technology index more is the feasibility. Table 3 revealed that the average technology index value was 27.53.

**Table 4:** Economic impact of Linseed varieties under FLD.

Season-Year variety	Cost of cultivation (Rs/ha)		Additional cost in Demo. (Rs./ha)	Sale price (MSP) of (Rs./q)	Net Return (Rs/ha)		Additional return in Demo. (Rs./ha)	Effective gain (Rs./ha)	IBCR
	Demo.	FP			Demo.	FP			
<i>Rabi</i> -2016-17 JLS-27	12750	10150	2600	4500	20955	12980	7975	5375	3.07
<i>Rabi</i> -2016-17 Indira-32	12750	10150	2600	4500	19470	11900	7570	4970	2.91
<i>Rabi</i> -2016-17 Kartika	12750	10150	2600	4500	19155	11360	7795	5195	3.00
<b>Average</b>	12750	10150	2600	4500	19860	12080	7780	5180	2.99

**Economic analysis:** Different variables like seed, fertilizers and pesticides were considered as cash inputs for the demonstrations as well as farmer's practice and on an average an additional investment of Rs. 2600 per ha was made under demonstrations. Economic returns as a function of grain yield and MSP sale price during the year. The maximum net return (Rs. 20955 per ha) by JLS-27 was obtained due to the higher grain yield. The higher additional returns and effective gain obtained 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 2.91 & 3.07 for Indira-32 and JLS-27 respectively (Table 4) depends on produced grain yield. Overall average IBCR was found as 2.99.

### Conclusion:

The results indicated that the Front Line Demonstration has ~~given had~~ a positive and significant impact ~~over on~~ the farming community of Balaghat district as they were motivated by the new agricultural technologies applied in the demonstrations. The demonstrated technologies were superior in every aspect compared to existing practices. Through FLD programme, productivity of Linseed has been increased ~~up~~ to 46.72% hence ~~increases~~ ~~increasing~~ income. The existing technology and extension gap should be minimized ~~through~~ ~~by~~ imparting scientific knowledge to the farmers ~~by through~~ extension personnel. However, the yield level under FLD was superior ~~over to~~ local Linseed variety and ~~the~~ performance & potentiality of this variety could be further improved by adopting recommended management practices. The participating farmers play an important role in disseminating technologies to the neighbouring farmers. The FLD shows great impact on the use of improved varieties.

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