

# STUDY OF YIELD GAP OF FRONTLINE DEMONSTRATION (FLD) AND CONTROL PLOTS IN DIFFERENT DISTRICTS OF JHARKHAND

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*For the purpose of using the demonstration method effectively and systematically, the Indian Council of Agricultural Research (ICAR) initiated the National Demonstration Project in 1965. The subject specialists perform these demonstrations on one acre land. By this, scientific capability of scientist of growing more crops can be known and the farmers are also trained to follow new methods for growing more. The details of expenditure and earning are presented in front of the farmers, so that they are encouraged to follow the new agricultural techniques.*

## INTRODUCTION

Among the methods of extension, demonstration is the most popular medium. Due to the greater impact of sense of vision, the demonstration methods are initiated in the agricultural extension. The “first result demonstration was started in Texas of America in 1903; where the farmers received the knowledge of new agricultural methods, developed instruments seed, and the technology related to crop production. Like exhibition, through demonstration the comparative study of new and old methods of agriculture are introduced to the farmers and to attract the people to follow the improved methods.

For the purpose of using the demonstration method effectively and systematically, the Indian Council of Agricultural Research (ICAR) initiated the National Demonstration Project in 1965. The subject specialists perform these demonstrations on one acre land. By this, scientific capability of scientist of growing more crops can be known and the farmers are also trained to follow new methods for growing more. The details of expenditure and earning are presented in front of the farmers, so that they are encouraged to follow the new agricultural techniques. Present study aims to analyse the yield gap of various crops of FLD produce and control plots’ produce.

Front line demonstration (FLD) are conducted on farmers field of Krishi Vigyan Kendra (KVKs) of Birsa Agricultural University, Ranchi, Jharkhand in different districts of the state on different aspects of agricultural technology related to crop production, soil protection, crop protection etc. The present study is related to field demonstration conducted by KVKs scientists on farmer’s field in Kharif and Rabi seasons of 2013-14 for various crops to see the capacity of yield of new variety in comparison to total variety used by farmers on their field. Keeping in view, this study was under taken to examine yield gap between new variety and local variety and also examine the variability among yield of different demonstration and local varieties conducted by scientists and farmers in different locations.

## MATERIALS AND METHOD

The study is based on secondary data, collected from annual report 2013-14 of Directorate of Extension Education, Birsa Agricultural University, Ranchi. The front line demonstrations (FLD) were conducted by scientists of Krishi Vigyan Kendra (KVK’s) of Birsa Agricultural University during 2013-14 in different districts of the state.

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Front line demonstration were conducted in crops viz. Paddy, Wheat, Pulses and oilseed crops with full package of practices (Improve varieties seed, full dose of chemical fertilizer, pesticides, irrigation etc.). Local varieties were grown by the farmers with local technology on their fields. Lastly compare the yield and returns of demonstration plots and farmers' plots. For analysis of data simple statistical tools /technique were used to derive the objective of the study. The coefficient of variation and standard deviation were measured through the following formula:

$$S.D. = \sqrt{\frac{1}{n} \left( \sum_{i=1}^n x_i^2 - \frac{\left( \sum_{i=1}^n x_i \right)^2}{n} \right)} \quad C.V. = \frac{S.D.}{Mean} \times 100$$

Where n= no. of observations and  $X_1, X_2, X_3, \dots, X_n$  be the observations.

SD= Standard Deviation and CV= Coefficient of variation

## RESULTS AND DISCUSSION

### Performance of Paddy Variety

Table no. 1 presents yield of paddy (Sahbhagi) under FLD and local check on farms plots of different district of Jharkhand.

The demonstration of Sahbhagi variety of paddy was conducted on 89 hectare of farmer's land by Krishi Vigyan Kendra (KVKs) of BirsA Agricultural University, Ranchi during 2013-14 on farmers plots of different districts and result is presented in table no. 1. It reveals from the data that average yield of Sahbhagi variety was significantly high as compared to farmers' paddy variety of farmers in the regions of the state. The average yield of Sahbhagi was recorded to about 33 quintals per hectare and local check was 25.5 quintal per hectare. The percentage gap in yield of two varieties was recorded nearly 32%.

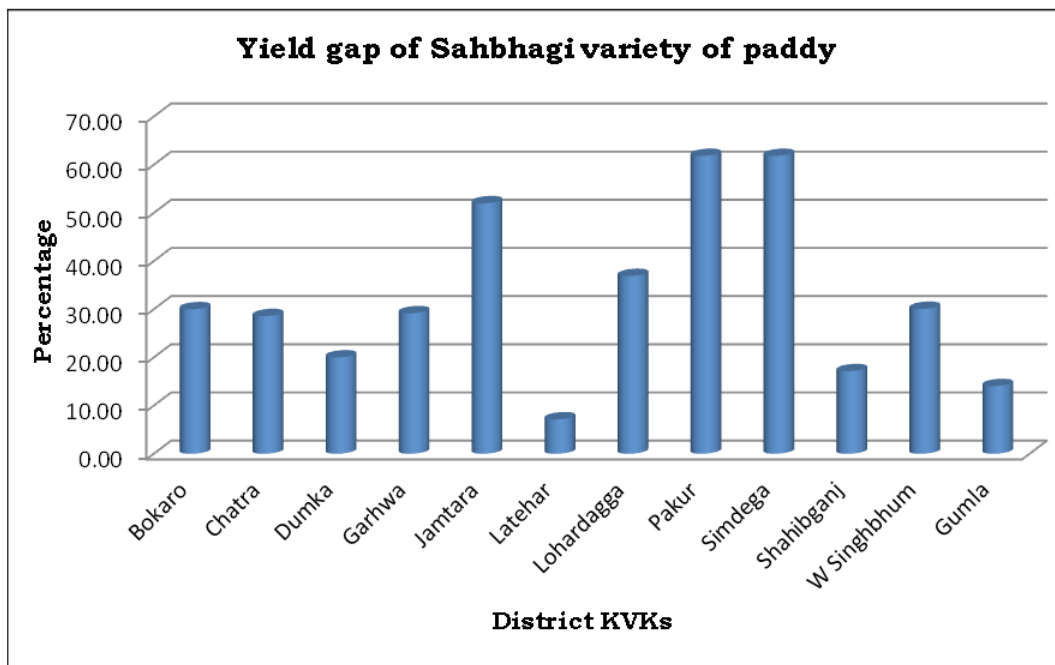
**Table 1, Yield Gap Of Paddy (Sahbhagi Variety) Fld And Control Plots Conducted By KvkS On Selected Farmers In Jharkhand (2013-14)**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Bokaro	32.50	25.00	7.50	30.00
2	Chatra	27.00	21.00	6.00	28.57
3	Dumka	30.00	25.00	5.00	20.00
4	Garhwa	31.00	24.00	7.00	29.17
5	Jamtara	38.00	25.00	13.00	52.00
6	Latehar	24.00	22.40	1.60	7.14
7	Lohardagga	34.50	25.20	9.30	36.90
8	Pakur	42.40	26.20	16.20	61.83
9	Simdega	30.10	18.60	11.50	61.83
10	Shahibganj	41.00	35.00	6.00	17.14
11	W Singhbhum	35.25	27.10	8.15	30.07
12	Gumla	35.89	31.47	4.42	14.05
Average		33.47	25.50	7.97***	32.39

\*\*\* Significance at 1% probability level

Source: KVK annual report, 2013-14.

Figure: 1



### Performance of wheat variety

The trial of HYV of wheat (K 307) was conducted on 23 hectare land of farmers of five districts during rabi seasons of 2013-14 by KVKs scientists of BAU and results is represented in table 2.

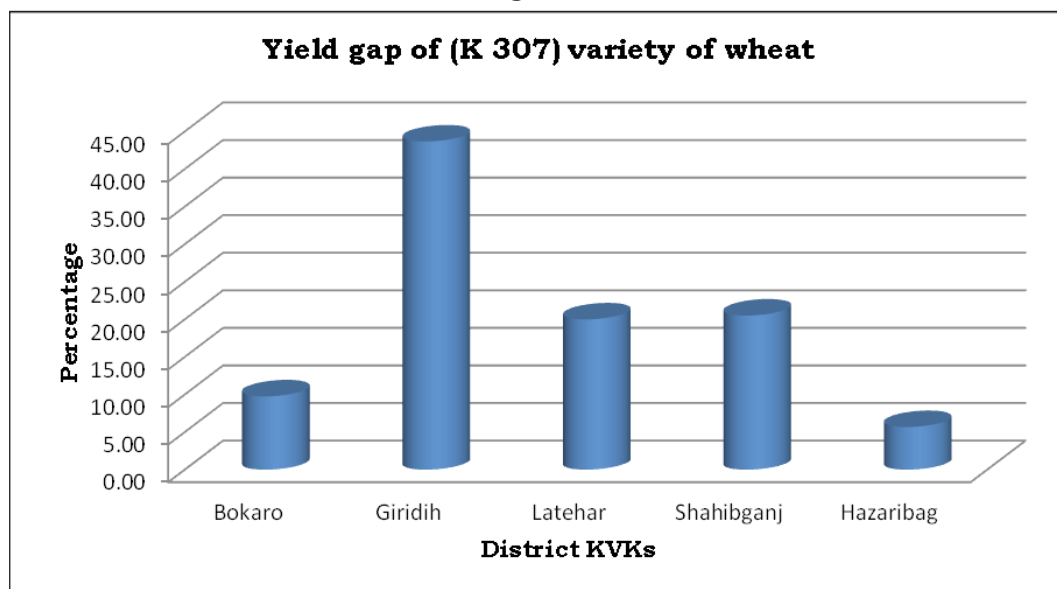
**Table 2, Yield Gap Of Wheat (K 307 Variety) Fld And Control Plots Conducted By Kvk On Selected Farmers In Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Bokaro	27.00	24.60	2.40	9.76
2	Giridih	34.05	23.70	10.35	43.67
3	Latehar	30.00	25.00	5.00	20.00
4	Shahibganj	47.00	39.00	8.00	20.51
5	Hazaribag	38.16	36.11	2.05	5.68
Average		35.24	29.68	5.56**	19.92

Source : KVK annual report, 2013-14.

\*\* Significance at 5% probability level

Figure: 2



The average yield of K 307 variety of wheat was recorded to be 35 quintals per hectare which was about 5.33 quintals (nearly 20%) higher than that of the farmer's variety (29 quintals/ hectare) respectively. The difference in yield was statistically significance at 5% probability level.

### Performance of Niger Variety

The trial of HYV's of Niger (BW 1) variety was conducted on nearly 11.50 hectare areas of different farmers in four districts of the state during Kharif season (2013-14) by KVK's scientists. The average yield of BW 1 variety was significantly high as compared to farmer's existing variety. The yield gap was near about 32 per cent between scientist variety and existing farmer's variety. The average yield of demonstration plots and farmer's plots was about 5 quintals per hectare and 4 quintals per hectare, respectively.

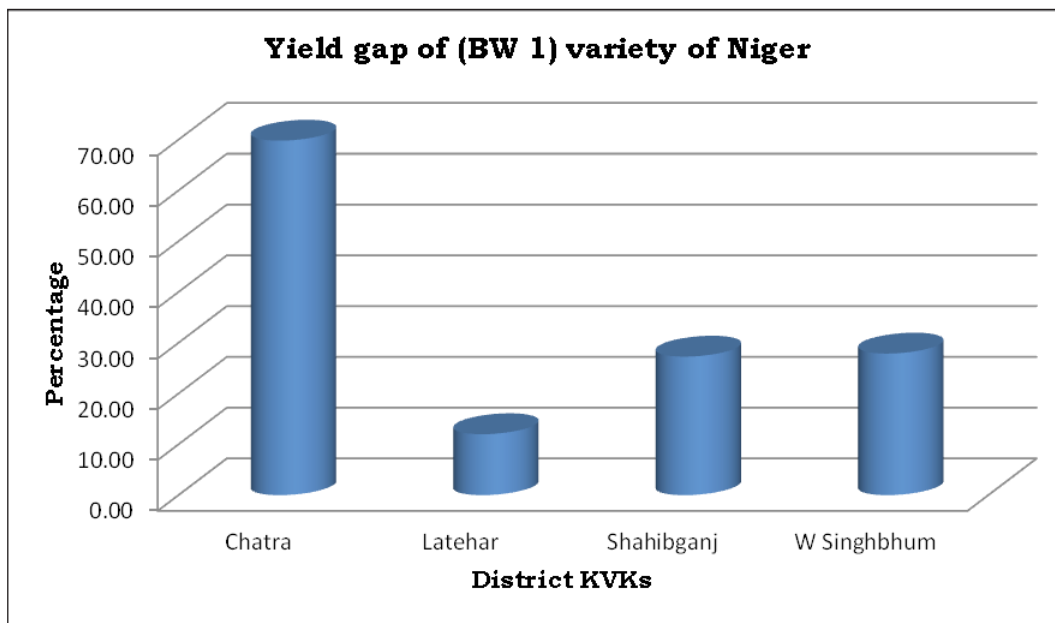
**Table 3, Yield Gap Of Niger (Bw 1 Variety) Fld And Control Plots Conducted By KVKs On Selected Farmers In Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Chatra	4.50	2.65	1.85	69.81
2	Latehar	2.80	2.50	0.30	12.00
3	Sahibganj	7.00	5.50	1.50	27.27
4	W Singhbhum	5.78	4.52	1.26	27.88
Average		5.02	3.79	1.23*	32.45

\* Significance at 10% probability level

Source: KVK annual report, 2013-14.

Figure: 3



### Performance of Shivani of Mustard Variety

The demonstration of Shivani variety of mustard was conducted during Rabi season of 1013-14 on 47 hectare area of different farmers of five districts of the state and result is depicted in table no. 4. The result shows that the average yield of Shivani mustard variety was quite high than that of farmer's variety. The difference was statically significant at 5% probability level. The average yield of FLD Plots and farmer's plots was about 6 quintals per hectare and 5 quintals per hectare.

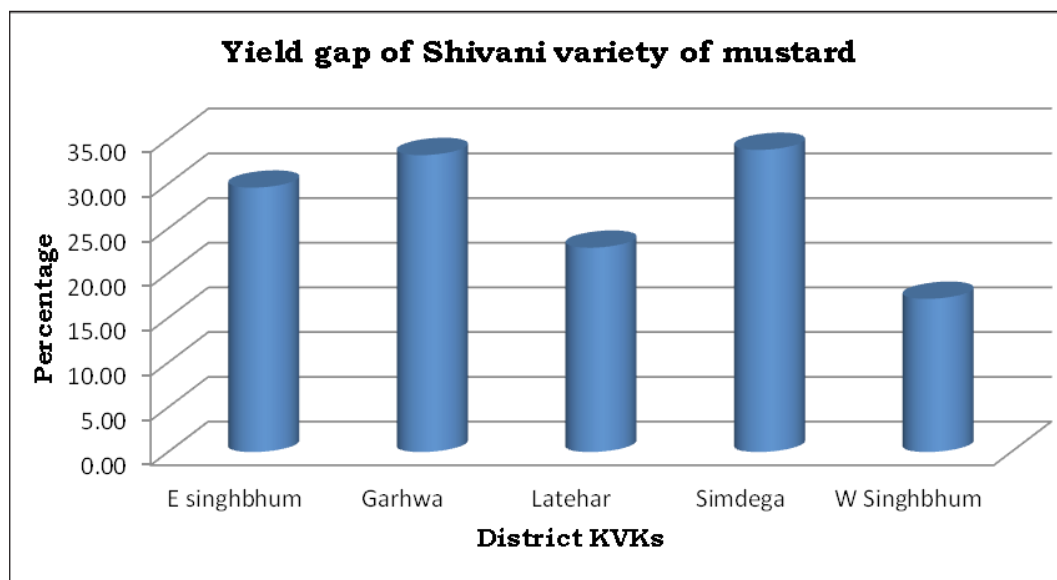
**Table 4, Yield Gap Of Mustard (Baur 9502 Variety) Fld And Control Plots Conducted By Kvk's On Selected Farmers In Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Esinghbhum	4.03	3.11	0.92	29.58
2	Garhwa	7.90	5.93	1.97	33.22
3	Latehar	4.30	3.50	0.80	22.86
4	Simdega	9.50	7.10	2.40	33.80
5	W Singhbhum	6.15	5.25	0.90	17.14
Average		6.38	4.98	1.40**	27.32

Source: KVK annual report, 2013-14.

\*\* Significance at 5% probability level

Figure: 4



- V. Performance of Pusa Mahak variety of mustard : The trail on this variety was conducted in 113 hectare of land in Rabi season 2013-14 of different farms plots of five districts of the state and is presented in table no. 5. The result indicates that the average yield of Pusa Mahak was near about 9 quintals per hectare, while the farmer's variety yields nearly 6 quintals. The Pusa Mahak fetches more than 2.50 quintals higher yield on the farms which was highly significant. The yield gap was about 44% between two methods of practices.

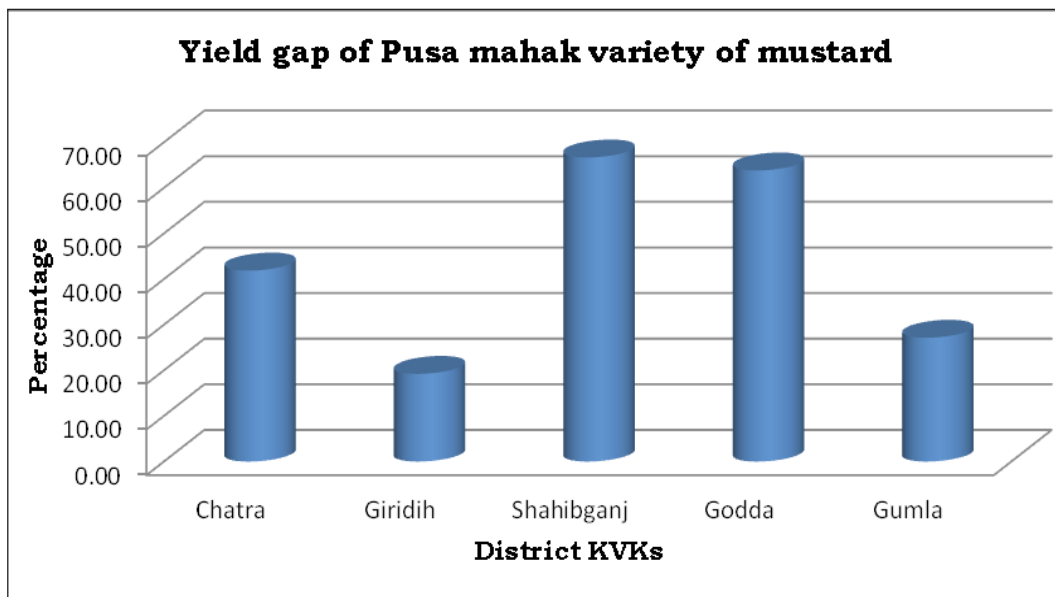
**Table 5, Yield gap of mustard (Pusa Mahak variety) FLD and control plots conducted by KVKs on selected farmers in Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Chatra	9.25	6.52	2.73	41.87
2	Giridih	7.07	5.93	1.14	19.22
3	Shahibganj	9.5	5.7	3.8	66.67
4	Godda	7.47	4.56	2.91	63.82
5	Gumla	10.54	8.29	2.25	27.14
Average		8.77	6.20	2.57***	43.74

Source: KVK annual report, 2013-14.

\*\*\* Significance at 1% probability level

Figure: 5



### Performance of Pulse Variety (KPG 59) :

The trial of (KPG 59) variety of Pulse was conducted on 20 hectare area of different farmers located in district of different sub agro climatic region of the state and result is given in table no. 6. The yield of (KPG 59) pulse variety was highly significant in respect to farmer's variety. The difference was nearly 4 quintals between two practices. The average yield was recorded to be 16.42 quintals and 12.5 quintals of KPG 59 and farmer's variety.

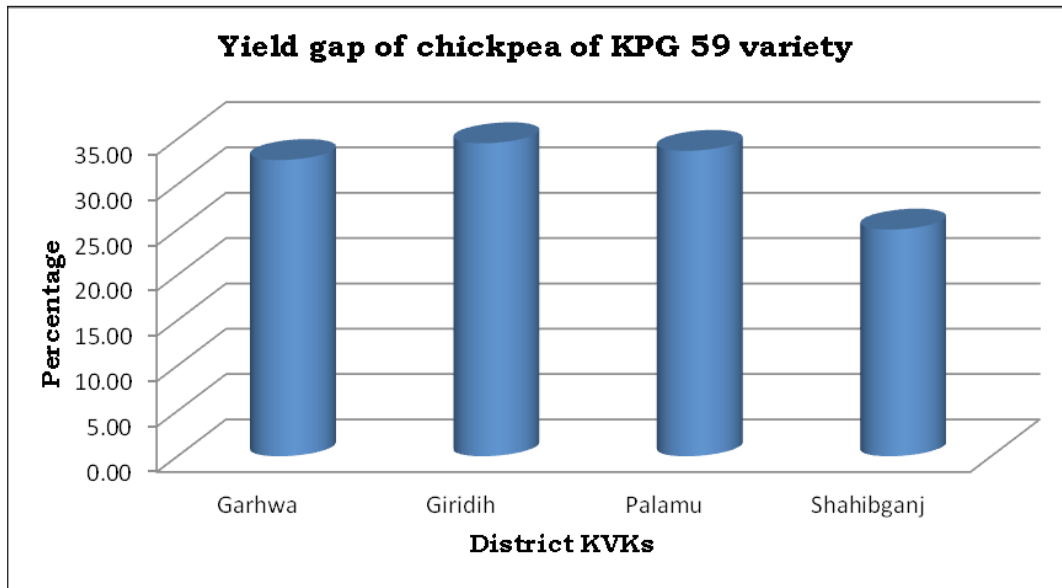
**Table 6, Yield Gap Of Pulse (Kpg 59 Variety) Fld And Control Plots Conducted By Kvk On Selected Farmers In Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control(Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Garhwa	13.40	10.10	3.30	32.67
2	Giridih	18.43	13.70	4.73	34.53
3	Palamu	16.35	12.23	4.12	33.69
4	Sahibganj	17.50	14.00	3.50	25.00
Average		16.42	12.51	3.91***	31.47

Source: KVK annual report, 2013-14.

\*\*\* Significance at 1% probability level

Figure: 6



### Performance of Pulse Variety (ND 1)

The trial of this variety was conducted on 26.50 hectare land of different farms in Rabi season (2013-14) in six districts of the state. The result (table 7) revealed that ND 1 variety was much more superior over farmer's variety during trial. The average yield difference was about 5.0 quintal between two practices. The overall mean yield of ND 1 and farmer's variety was recorded to be 13.56 quintals and 8.67 quintals, respectively.

**Table 7, Yield Gap Of Pulse (Nd 1 Variety) Fld And Control Plots Conducted By Kvk's On Selected Farmers In Jharkhand (2013-14).**

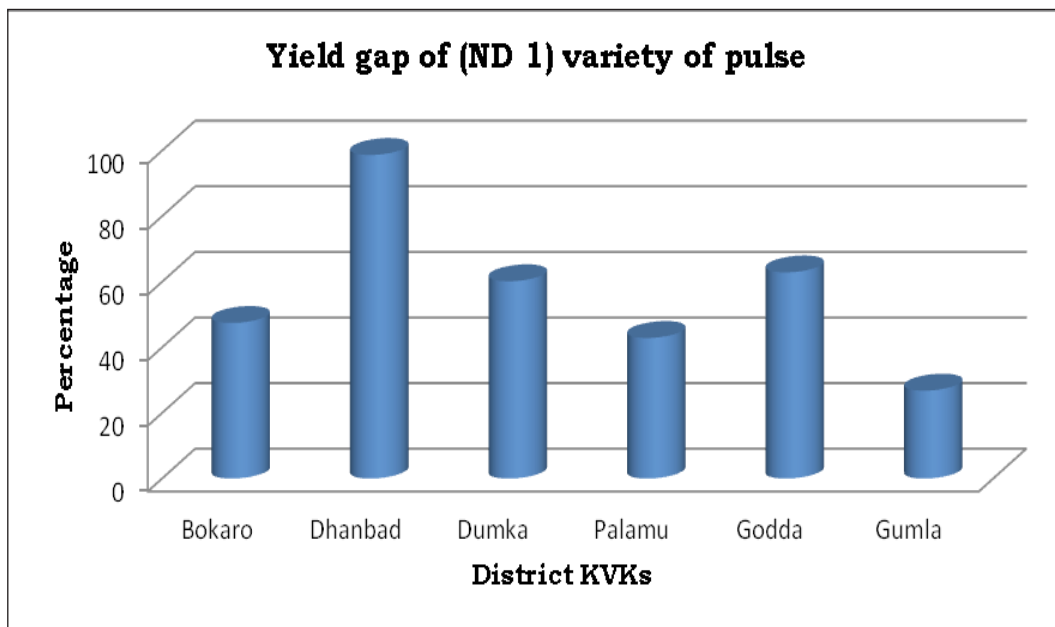
Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control (Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Bokaro	11.50	7.80	3.70	47.44
2	Dhanbad	14.90	7.50	7.40	98.67
3	Dumka	21.30	13.30	8.00	60.15
4	Palamu	10.00	7.00	3.00	42.86
5	Godda	12.80	7.86	4.94	62.85
6	Gumla	10.88	8.58	2.30	26.81
Average		13.56	8.67	4.89***	56.38

Source: KVK annual report, 2013-14.

\*\*\* Significance at 1% probability level



Figure: 7



### Performance of Pulse Variety (ICPL 87119)

The trail was conducted in 12 hectare area of different farm in the three districts during rabi season 2013-14 and yield data are presented in table 8. The ICPL- 87119 variety was significantly superior to the farmer's existing variety. The yield difference was near about 5 quintals between these two varieties. The average yield of FLD plots and farmers plots was about 15 quintals per hectare and 10 quintals per hectare, respectively.

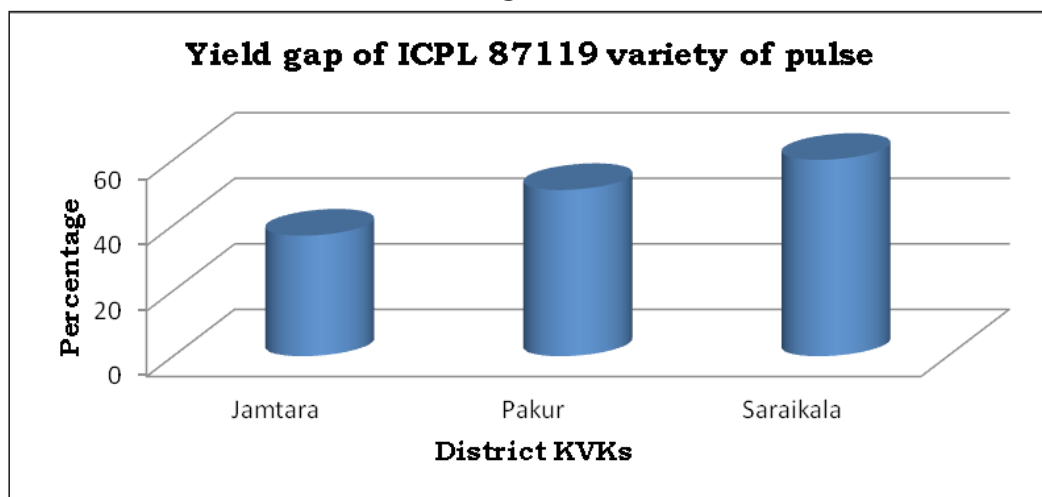
**Table 8, Yield Gap Of Pulse (Icpl 87119 Variety) Fld And Control Plots Conducted By Kvk On Selected Farmers In Jharkhand (2013-14).**

Sl. No.	District KVK	FLD Plots (Qtl/ha.)	Control (Qtl/ha.)	Gap (Qtl)	Gap (%)
1	Jamtara	13.00	9.50	3.50	36.84
2	Pakur	15.20	10.08	5.12	50.79
3	Saraikala	16.00	10.00	6.00	60.00
Average		14.73	9.86	4.87*	49.43

Source: KVK annual report, 2013-14.

\* Significance at 10% probability level

Figure: 8



### Coefficient of Variation

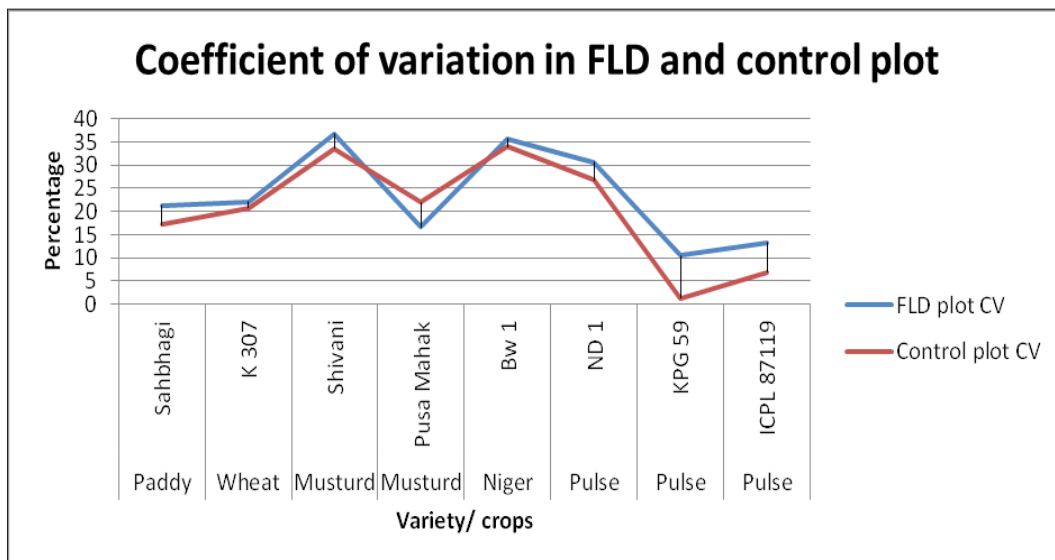
The variation in yield of HYV's of selected crops for trial in the districts on farmers field and variation in yield of existing variety of farmer's was analyzed separately for both systems and is represented in table no. 9. The result reveals that the variation among in yield of HYV of paddy (Shahibganj) was nearly 21.00 per cent which was conducted by the scientists in different sub agro-climatic zones of the state. In case of farmer's variety of paddy it was about 17 per cent shows less variation than the variation in yield of trail variety conducted by KVKs scientist. Similarly in case of HYV of wheat (K 307) the variation among yield of this variety was 22 per cent which was again more than the variation among yield of farmer's variety.

**Table 9, Coefficient Of Variation (Cv) In Yield Of Fld And Control Plots On Selected Farmers In Jharkhand (2013-14).**

(Figure in percentage)

Sl. No.	Crops	HYV Variety	FLD CV	Crops	Control CV
1	Paddy	Sahbhagi	21.3	Paddy	17.12
2	Wheat	K 307	22.14	Wheat	20.74
3	Mustard	Shivani	36.74	Mustard	33.53
4	Mustard	Pusa Mahak	16.6	Mustard	21.93
5	Niger	BN 1	35.65	Niger	34.03
6	Pulse	ND 1	30.64	Pulse	26.78
7	Pulse	KPG 59	10.55	Pulse	1.37
8	Pulse	ICPL 87119	13.27	Pulse	6.97

Figure: 9



The analysis further indicates that yield of Shivani variety of mustard shows more variability during trail (about 37%) in the regions of the state while farmer's variety indicates less variabilities in the yield of the state. The Pusa Mahak variety indicates less variability (16%) in yield in the state as compared to farmer's variety (22%) during trail period. The variability in yield data shows that selected variety of pulses (ND 1, KGP 59 and ICPL 87119) lead high variability in yield in the state as compared to their counterpart. The BW 1 variety of niger indicates more instability in yield than that of comparable variety. The results explain that improved package and practices are associated with high instability in yield than that of local technology. This may be probability due to several other factors which are beyond control of the management.

### Absolute Variation in FLD and Control Plot

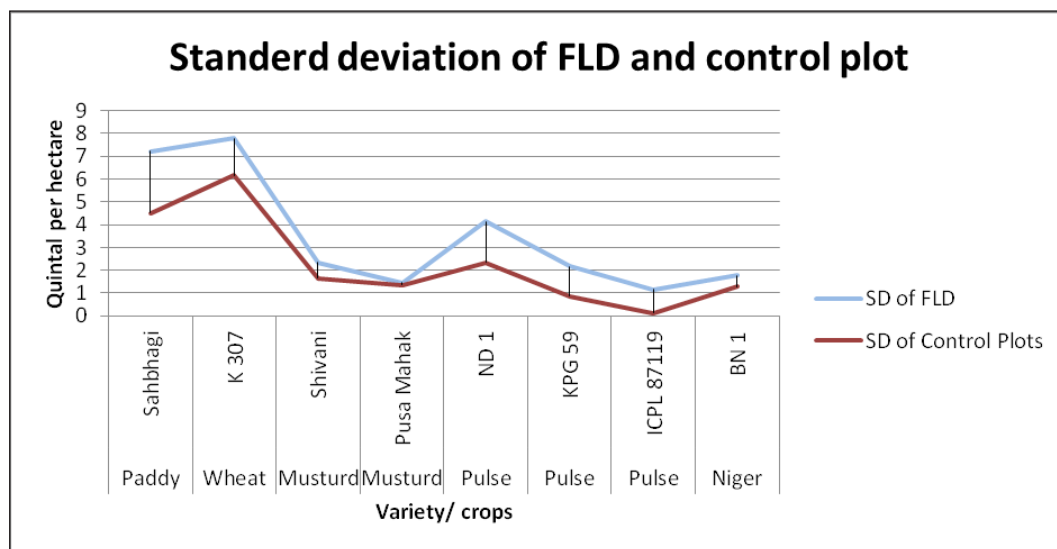
It is evident from the table no. 10 that variation in absolute term in yield of selected varieties among in front line Demonstration (FLD) was moderately high as compared to control plots. This analysis clearly indicates that improved technology leads to high variation in yield performance in spite of technical supervision. The maximum variation was recorded in cereal crops (paddy and wheat) crops followed by pulses and other oil seed crops respectively. The high variation in yield of HYV requires special attention of the scientists for stabilizing yield of the varieties and also develops suitable strain for different regions of the state.

**Table 10, Standard Deviation (Sd) In Yield Of Fld And Control Plots On  
Selected Farmers In Jharkhand (2013-14).**

(Quintal per hectare)

Sl No.	Crops	HYV variety	FLD SD	Farmers variety	Control Plots SD
1	Paddy	Sahbhagi	7.22	Paddy	4.50
2	Wheat	K 307	7.79	Wheat	6.15
3	Musturd	Shivani	2.34	Musturd	1.66
4	Musturd	Pusa Mahak	1.45	Musturd	1.36
5	Pulse	ND 1	4.15	Pulse	2.34
6	Niger	BW 1	1.78	Niger	1.29
7	Pulse	KPG 59	2.18	Pulse	0.87
8	Pulse	ICPL 87119	1.15	Pulse	0.13

**Figure: 10**



## CONCLUSIONS

From the study of yield gap of Front Line Demonstration (FLDs) and yield of farmer's plots, it can be concluded that yield of demonstration varieties is significantly high as compared to local varieties grown by the farmers. The yield of paddy and wheat is about 8 quintals and 5 quintals per hectare high in demonstration field. Similarly in case of pulse varieties, yield is high in the range of 4 quintal to 5 quintal per hectare in the demonstration plots. The oilseed crops in FLD fetch 1.5 quintals to 2.0 quintals more than that of local checks. However this analysis observed that yield

variability risk is more in improved technology in all demonstrated varieties in comparison to local check/ farmers varieties. The result shows that heavy investment in agriculture is always with high risk. There is an ample scope for increasing present level of productivity in all crops. The breeder should evolve such strains that minimized risk in variety of yield.

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