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Impact of Cluster Frontline Demonstrations on Yield and Economics of Mustard in District Balrampur, Uttar Pradesh

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Abstract

Rapeseed-mustard is an important oil seed crop grown across the country, pre-dominantly in North, North Western and North-Eastern Region of the county. Uttar Pradesh is a leading mustard producing state in India among which Balrampur is also a mustard producing district. Paddy–Toriya /mustard-sugarcane (autumn) is major cropping pattern of district Balrampur in which delayed maturity of mustard creates problem in sowing of autumn sugarcane. Keeping this point in view, present study was undertaken by conducting cluster frontline demonstration (CFLD) with three improved varieties viz. NRCHB101, NRCYS05-2 and PPS-1. Most of the recommended practices of mustard crop was applied in the demonstration plot. Yield and economic parameters were recorded in demonstration as well as control (Farmers Practice). Variety NRCHB101 showed better yield (15.24q/ha) and economic performance in comparison to other varieties and control. Technology Gap, Extension Gap and Technology Index were calculated to assess the impact of CFLD. Least technology gap (2.08) and technology index (12.0) was observed in the case of CFLD with variety NRCHB101. Variety NRCHB101 and NRCYS 05-02 were matured in second week of February with good yields whereas variety PPS-1 was matured few days early (first week of February) at same date of sowing. Due to early maturity variety NRCHB101 can replace variety PT303, whereas, variety NRCYS 05-02 and PPS-1 can replace variety Goldi. Therefore, it can be concluded from the present findings that variety NRCHB101, NRCYS05-02 and PPS-1 is most suitable for autumn growing sugarcane farmers in paddy-toriya/ mustard - sugarcane (autumn) cropping system in the district. It can also be concluded from the present study that cluster frontline demonstration (CFLD) of present varieties has positive effect over the existing practices.

Key words : *Mustard, CFLD, technology gap, extension gap.*

Introduction

Among the oil seed crops, mustard occupies a prominent position in Indian oilseeds scenario. It occupies third position in the list of rapeseed/mustard producing countries contributing around 11% of the world's total production (1). Mustard is the major source of income, especially for the marginal and small farmers in rain fed areas. Because of low water requirement, mustard crop fit well in the rain fed cropping system. Mustard is a highly preferred edible oilseed crop cultivated in 5.76 mha area of the country with a production of 6.82 mt and 1184 kg/ha productivity (2). More than 85% production of rapeseed and mustard comes from 05 states namely Rajasthan (48%), Haryana (12%), Madhya Pradesh (10%), Uttar Pradesh (9%) and West Bengal (7%) (DACFW, 2017). Agra and Mathura are the major mustard producing district of Uttar Pradesh (3).

Paddy–toriya/mustard-sugarcane (autumn) is major cropping pattern of district Balrampur. More than 60% of total area is sown by autumn sugarcane. For the sowing of autumn sugarcane the farmers of district widely adopted sowing of toriya after harvesting of paddy. Delayed sowing of Toriya (upto 15 September) results in to poor yield due to cloudy, rainy and foggy weather occurs during last December to first week of January. Due to unfavorable weather condition at the time of maturity, toriya harvesting and threshing is more difficult. Whereas, sowing of sugarcane is completed in last week of February to last March.

Keeping the above problem in view, the cluster frontline demonstration was conducted with the objective of to replace toriya with mustard and to increase productivity of mustard by using short duration varieties in stipulated period between paddy and sowing of autumn planting sugarcane in district Balrampur, Uttar Pradesh

Materials and Methods

Balrampur is one of the most backward district of Devipatan division of eastern region of Uttar Pradesh which is situated at the foot hills of Himalaya. The district is located between 27.43° north latitude and 82.30° east longitude. District comes under north eastern plain zone which has a relatively subtropical climate with high

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Table-1 : Package and practices of mustard in CFLDs and farmer's plot.

Particulars	CFLD Plot	Farmers Practices Plot
Farming situation	Semi irrigated	Semi irrigated
Verities	NRCYS 05-02 (Yello), NRCHB101(Black), PPS-1 (Yellow)	PT303 (Black), Goldi (Yellow).
Time of sowing	10-15 October	15-30 September
Seed treatment	2gm. Thiram + 1gm. Carbendazim per kg seed	No treatment
Seed rate	5.0 Kg/ha	7.5 Kg /ha
Fertilizer dose	N:P:K:S (60:30:20:20)	N:P:K:S (20:20:0:0)
Plant protection	Need based application of Immidachlorpid @ 0.5ml/liter water and 3 gm Sulfex to protect the crop from aphid and diseases	No any Plant Protection Measures applied
Weed management	Pendemethaline @ 3.3 liter/ha Pre-emergence	No any weed management practices applied
Date of Harvesting	NRYS05-02 and NRHB101 IInd week of February PPS-1 Ist week of February	Last December to first week of January

Table-2 : Detailed characteristics of different varieties used in CFLDs.

Crop	Yellow Sarson	Indian mustard	Yellow Sarson
Variety name	Pant Pili Sarson-1 (PPS-1)	NRCHB101	NRCYS05-02
Developed By	GBPUT, Pantnagar (U.K.)	DRMR, Bharatpur (Raj.)	DRMR, Bharatpur (Raj.)
Notification year	2010	2009	2009
Released from	State	Central	Central
Plant height (cm)	110-120 cm	170-200	110-120
Maturity period (days)	107-113	105-135	94-181
Oil contant (%)	39.5-45.5%	34.6-42.1%	38.2-46.5
Seed size (mm)	2.8-3.5	3.6-6.2	2.2-6.6
Recommended for	Rainfed	Rainfed and Irrigated	Rainfed
Special attribute	Droopysiliquae arrangement, tetralacular		Early maturity, medium height and high oil content
Potential yield (kg/ha)	2190	1732	2403
Average yield (kg/ha	1056-1251	1382-1491	1239-1715

variation between summer and winter temperature. The temperature of the district varies from 50°C during winter to 45°C during summer. The maximum rainfall occurs in last week of July and first week of August. The average rainfall of the district was 1100 mm with un even distribution. Hot wave flows in the month of May and cold waves during January. Rape seed and mustard very important oil seed crop the of study area which give good benefit to the farmers under the semi irrigated conditions. The soil of the study areas is clay low with medium level of NPK having scarcity of sulphur.

Present study was carried out by Krishi Vigyan Kendra Balrampur, Uttar Pradesh during Rabi session of 2017-18 on the farmers field of three adopted villages namely Ratanpur , Udaipur and Pipri -jamuni of Balrampur district. The cluster frontline demonstrations on mustard varieties, NRCYS-05-02, NRCHB101 and PPS-1 were conducted on 60 ha area with 50 beneficiary farmer. All the three varieties were demonstrated in each selected village. The plot size of each demonstration plot was kept 0.40 ha. Before conducting cluster frontline demonstration farmers were selected on the basis of survey and group discussion in the villages, after that specific skill training was imparted to the selected farmers regarding improved package and practices of mustard cultivation. Newly released improved varieties were sown in demonstration plot with line sowing technique, balance fertilizer and timely weeding. Farmers plots were taken as local check in which no any intervention was applied (Table-1)

The necessary steps for site selection and demonstration layout was adopted as suggested (4). The data on yield and economic parameters were collected from both cluster frontline demonstration plots as well as control plots and finally the extension gap, technology gap, technology index along with benefit cost ratio were worked out as per the following formula as adopted by (4,5,6).

Technology gap = Potential Yield – Demonstration Yield

Extension gap = Demonstration Yield – Farmer's Yield

$$\text{Technology Index} = \frac{\text{Potential Yield} - \text{Demonstration Yield}}{\text{Potential yield}} \quad 100$$

Table-3 : Productivity, Technology gap, Extension gap and Technology index in different varieties of mustard under cluster demonstration.

Name of variety	Area (ha)	No. of farmers	Potential	Grain yield q/ha		% increase over control	Techno-logy gap	Extension gap	Techno-logy index %
				Demo	Control				
NRCYS05-02	20.00	50	24.03	14.54	9.54 (Goldi)	34.38	9.49	5.0	39.9
NRCHB101	20.00	50	17.32	15.24	8.75 (PT 303)	42.58	2.08	6.49	12.00

Table-4 : Impact of cluster front line demonstration packages on yield attributing characters of Mustard.

Parameters	Variety	Performance in Demonstration Plot	Performance in Farmers Plot
No. of siliqua/plant	NRCYS05-02	108-114	90-102
	NRCHB101	117-121	105-108
	PPS-1	90-105	85-90
No. of grain/siliqua	NRCYS05-02	30-32	25-28
	NRCHB101	35-38	32-35
	PPS-1	28-30	24-26
Test weight	NRCYS05-02	3.2-3.5	2.8-3.2
	NRCHB101	3.5-3.8	3.0-3.4
	PPS-1	2.8-3.0	2.5-2.8

Results and Discussion

The result presented in table-3 revealed that the yield of different varieties fluctuated successively in demonstration plots. The maximum yield was observed (15.24q/h) with variety NRCHB101 followed by NRCYS05-2 (14.54q/h) and minimum yield was recorded in variety PPS-1(12.22q/h), which was significantly more than control verities (Goldi-9.54q/h, 9.15q/h and PT303 (8.75q/h). In comparison to farmer's practice (control), the yield in demonstration plot was increased in between 25.12 % to 42.58%. Maximum yield was recorded in case of variety NRCHB101 (15.24 q/ha) which was 42.58 % higher than control variety (Goldi). Variety NRCYS05-02 recorded 14.54 q/ha yield with 34.38 % increase over control (PT-303). Among all the demonstrated varieties, variety PPS-1 recorded minimum yield (12.22 q/ha) which showed 25.12 % increase yield over control (Goldi). The results are in conformity with (7,8). It is clear from the present finding that cluster frontline demonstration has a positive effect over existing practices towards enhancing yield attributes of mustard in the study area.

Data given in Table-4 indicate that the yield parameters *viz,* numbers of silqua per plant, number of seed per silqua and test weight of demonstration plots were found maximum in the case of demonstration with variety NRCHB101 followed by NRCYS 05-02 and PPS-1. Control plots (Farmers Practice) showed least yield parameters. The impact of cluster frontline demonstration was assessed by calculating the technology gap, technology index and extension gap (Table-3). Least technology gap (2.08) and technology index (12.0) was observed in the case of CFLD with variety NRCHB101 followed by NRCYS 05-02 (9.49 and 39.9) and PPS-1 (9.68 and 45.89). The variation in technology gap, technology index and extension gap was observed may be attributing to the dissimilarity of varietal characters, soil fertility and weather conditions, similar findings were also reported by (9,10,11).

The technology gap, extension gap and technology index showed the feasibility of the evolved technology at the farmers field. The lower value of technology gap, technology index and extension gap is showing more feasibility of technology (5). Present finding is also in conformity with that of (6). Data presented in table-5 revealed that the highest gross returns (Rs 52578), net return (Rs 36078) and B.C ratio (3.19) was recorded with variety NRCHB101 followed by NRCYS 05-02 and PPS-1 whereas lowest gross return, net return and B.C. ratio and were found in PPS-1 and control plot. It was also observed during study period that all three varieties give better yield within stipulated period between paddy and autumn sowing sugarcane variety. NRCHB101 and NRCYS 05-02 were matured in second week of February with good yields whereas variety PPS-1 was matured few days early (first week of February) at same date of sowing. It was also observed that variety NRCHB101 can replace variety PT303, whereas, variety NRCYS 05-02 and PPS-1 can replace variety Goldi which is mostly used by farmers of district Balrampur for sowing of autumn planting of sugarcane.

Therefore, it can be concluded from the present findings that variety NRCHB101, NRCYS05-02 and PPS-1 is most suitable for autumn growing sugarcane farmers in paddy-toriya/mustard-sugarcane (autumn)

Table-5 : Impact of cluster front line demonstration packages on economic parameters of Mustard.

Variety demonstration	Farmers Existing plot				Demonstration plot				Farmers feedback
	Gross cost (Rs/h)	Gross return (Rs/h)	Net return (Rs/h)	B:C Ratio	Gross cost (Rs/h)	Gross return (Rs/h)	Net return (Rs/h)	B:C ratio	
NRCYS-05-03	13000	32913	19913	2.53	16500	50163	33663	3.04	Acceptable for early sowing
NRCHB-101	13000	30887	17887	2.38	16500	52578	36078	3.19	Highly acceptable for early sowing
Pant Pili Sarson-1 (PPS-1)	13000	31567	18567	2.43	16500	42159	25659	2.56	Acceptable for early sowing and autumn planting of sugarcane

cropping system in the district. It can also be concluded from the present study that cluster frontline demonstration (CFLD) of present varieties has positive effect over the existing practices. Therefore, selection of proper mustard varieties with improve production technology may reduce the extension and technology gap leading toward enhanced production and productivity of mustard as well as improve economic condition of farmers of Balrampur district of Uttar Pradesh.

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