



Research Article

ANALYSIS OF YIELD PERFORMANCE AND YIELD GAP OF BIOFORTIFIED MUSTARD VARIETY PUSA DOUBLE ZERO MUSTARD-31 WITH THE SPECIAL REFERENCE TO ADOPTION IN DISTRICT BIJNOR UTTAR PRADESH, INDIA

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Abstract: Biofortified Mustard variety Pusa Double Zero Mustard-31 was disseminated through Front Line Demonstrations at farmer's field in Bijnor district. The demonstrations conducted during last three years (2018-19 to 2021-22), were considered for the study. The adoption of Biofortified Mustard variety Pusa Double Zero Mustard-31 was significantly increased in farmers due to higher productivity, which ultimately resulted in more net return against existing farming technology.

Keywords: Biofortified, Mustard variety, Yield gap, Performance and adoption

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Introduction

Rapeseed-mustard is an important group of oilseed crops in India. It contributes 24.7% and 29.4%, respectively, to total area and production of oilseeds during 2018-19. Further, considering 20% contribution from secondary sources and 20-25% from rapeseed-mustard; the projected demand for this crop would be around 16.4-20.5 m t by 2030 from the current production of 9.26 mt. from the level of production of 33.50 m t during 2019-20.

In India, the major rapeseed-mustard growing states are Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh, West Bengal, Assam and Gujarat accounting for 92.7% of the area and 95.8% of production during 2017-18 of which Rajasthan alone account for 36.6% and 40.9%, respectively, of the area and production [1].

In Bijnor district, Uttar Pradesh, India total area under Mustard is about 6000ha with average district yield 10.00 qt/ha. The choice of right varieties is one of the crucial points determining the yield and quality of Mustard. The yield and productivity of Mustard varieties is less or stagnant due to farmers unawareness about Biofortified and high yielding varieties and non availability of varieties having significantly higher yield as compared to the existing varieties under changing climatic conditions.

Pusa Double Zero Mustard 31 is a pure line variety and contains low erucic acid (<2.0%) in oil and glucosinolates (<30.0 ppm) in seed meal. It has been released and notified in 2016 for Rajasthan (north and western parts), Punjab, Haryana, Delhi, western Uttar Pradesh, plains of Jammu and Kashmir and Himachal Pradesh. Its average oil content is 41.0 per cent, with a seed yield of 23.0 q/ha. It matures in 142 days and is suitable for timely sown irrigated conditions. This biofortified variety has been developed by ICAR-IARI, New Delhi [2].

The Krishi Vigyan Kendra, Bijnor (U.P.) were conducted 122 Front Line Demonstrations of Mustard variety Pusa Double Zero Mustard 31 during 2018-19 to 2021-22 at farmers field of district Bijnor for the study of its yield performance, yield gap and adoption in district

Material and Methods

The Front line demonstrations were conducted during 2018-19 to 2021-22 in Kotwali, Afjalgarh, Nehtor, Kiratpur, Haldaur, Dhampur, Seohara, Najibabad, Jalilpur, M. Devmal and Noorpur blocks of district Bijnor, at 122 farmers field for evaluation of performance, effectiveness and adoption of Pusa Double Zero Mustard 31 in comparison to farmers practice. The yield data from front line demonstration, as well as farmers practice were recorded by representative samples from different locations.

The following formulae have been used for estimation of technology gap, extension gap and technology index as per methods of Samui et al., (2000) [3] and Sagar and Chandra (2004) [4].

$Technology\ gap = Potential\ yield - Demonstration\ yield$

$Extension\ gap = Demonstration\ yield - farmers\ yield$

$Technology\ index = [(Potential\ yield - Demonstration\ yield) / Potential\ yield] \times 100$

Results and Discussion

The field performance and yield gap of the Pusa Double Zero Mustard 31 along with the local check were evaluated and data are given in [Table-1].

From the data given in [Table-1] it is quite clear that seed yield increased significantly in the range of 14.00 to 19.65 qt./ha in different blocks of Bijnor district, as compared to local check. Singh and Rana, (2006) [5] reported seed yield increase up to 20.70 qt. / ha by Pusa Barani Variety of mustard crop under irrigation condition. Singh et al., (2018) [6] reported seed yield in Wheat variety HD-3059. The benefit cost ratio of Pusa Double Zero Mustard-31 was also higher in all the blocks in comparison to local check. It varied from 2.60 to 3.45. In 2006, Hedge reported that mustard crop by nature is hardy and mostly grown under rainfed condition and can impart stability of production system under harsh condition [7,8]. The benefit cost ratio of HD-2967 was also higher in all the blocks in comparison to local check in district Saharanpur of Uttar Pradesh [9]. Singh and Singh (2019) [10] also reported higher benefit cost ratio in timely sown Wheat varieties.

Table-1 Economics and Technological Impact of Biofortified Mustard variety Pusa Mustard Double Zero-31

Name of Block	No. Of Trial	Avg. Yield (qt/ha)			% Yield increased	Cost of Cultivation (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	Additional Net Return (Rs/ha)	BCR	Technology gap (qt/ha)	Extension Gap (qt/ha)	Technological index	Adoption %
		P	IP	FP										
Kotwali	18	23	16.45	10.95	50.22	28977.78	78826.39	60000	10151.39	2.70	6.55	5.55	28.47	60.25
Ajajgarh	8	23	16.2	11.6	39.65	29300	76600	47300	15710	2.60	6.80	4.6	29.56	35.00
Nehtor	10	23	15.8	11.2	41.07	28840	76000	47160	13736	2.62	7.20	4.6	31.3	40.00
Kiratpur	9	23	16.61	11.69	42.07	28933.33	81305.56	52372.22	19494.44	2.80	6.39	4.92	27.78	32.50
Haldaur	10	23	17.75	11.18	58.76	29100	87000	57900	12095	2.97	5.25	6.57	25.43	35.50
Dhampur	10	23	17.5	10	75	29250	85375	56125	14675	2.91	5.50	7.5	29.91	38.75
Noorpur	10	23	18.16	11.54	57.36	29215	89916.67	60701.67	21173.34	3.06	4.84	6.62	21.04	52.50
Jalilpur	10	23	15.91	11.33	40.42	29383.33	81041.67	51658.33	8691.66	2.75	7.09	4.58	30.82	28.00
Najibabad	10	23	14	10.2	21.56	28940	64800	35860	14650	2.23	9.00	3.8	29.13	30.50
Seohara	12	23	19.65	12.05	63.07	29420	102875	73455	30105	3.49	3.35	7.6	14.56	55.50
M. Devmal	15	23	19.35	11.35	70.84	29520	103125	73605	37645	3.48	3.65	8	15.86	35.50
Mean	172	23	17.03	11.19	50.91	29170.86	84260.48	56012.47	18011.53	2.87	5.96	5.84	25.80	40.36

P = Potential yield, IP= Improved practice, FP = Farmers practice

The result obtained clearly indicate the technology gap range between 3.35 to 9.00 with an overall mean difference of 5.96 qt. / ha. Kadian *et al.*, (1997) [11] reported that technology gap can be narrowed down only by location specific technology based recommendations.

Adoption of Pusa Double Zero Mustard-31 has significant impact on seed yield vis a vis yield gap. Yield increased in demonstration field due to adoption of newly released variety. Adoption percentage ranged between 28.00 to 60.25 with a mean percent increase of 40.36 % as compare to local check. Rana *et al.*, (2002) [12] reported that the demonstration isquit successful in farmer practice. Singh *et al.*, (2011) [13] also reported that the adoption of basmati variety Pusa Basmati-1401 in farmer's practice. Singh and Singh (2019) also reported higher adoption of timely sown Wheat varieties.

Conclusion

The 122 demonstrations, conducted at farmers field during 2018-19 to 2021-22 resulted in higher yield and higher cost benefit ratio of PusaDouble Zero Mustard-31 led to higher adoption. The area under this variety has now spread to more than 3800 ha in just four years.

Application of research: Study shows the demand of quality seed of this variety is also increasing which has led to participatory seed production at farmer's field.

Research Category: Agricultural Extension

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Study area / Sample Collection: ICAR-Krishi Vigyan Kendra, Nagina, Bijour, 246762

Cultivar / Variety / Breed name: Pusa Double Zero Mustard-31

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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