P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; SP-Issue 8; August 2024; Page No. 11-13

Received: 14-05-2024
Accepted: 17-06-2024

Indexed Journal
Peer Reviewed Journal

Impact of frontline demonstrations on yield of wheat (*Triticum aestivum* L) in Porbandar district of Gujarat state

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DOI: https://doi.org/10.33545/26180723.2024.v7.i8Sa.891

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Abstract

Wheat is a major *Rabi* crop of Gujarat state accounts for nearly 29 percent of sowing area in the season. Porbandar district having nearly 20 percent sowing area under *Rabi* season. Most of the varieties are old which were under cultivation and gives lower yield. Wheat variety GJW-463 released by JAU in 2015-16 is having potential yield of 67.46 q/ha, if timely sown. Front line demonstrations of varietal evaluations of wheat variety GJW-463, were conducted at 30 farmers' fields under 12 ha for three years, to demonstrate production potential and economic benefits of improved technologies. Study revealed that improved cultivation practices comprised under FLDs viz., recommended variety, seed rate, timely sowing resulted in increase in yield in wheat crop over the check plots. The improved technologies gave higher yields and recorded a mean yield of 30.06, 33.94 and 49.75 q/ha during the year 2018-19, 2019-20 and 2020-21, respectively which was 16.51, 6.06 and 12.75 percent higher compared to prevailing farmers practice. The technology gap was 37.40, 33.52 and 17.71 q/ha and extension gap was 4.26, 1.94 and 5.62 q/ha during the year 2018-19, 2019-20 and 2020-21, respectively.

Keywords: Front line demonstrations (FLDs), wheat, GJW-463

Introduction

Wheat, a staple crop worldwide, plays a pivotal role in the agricultural landscape of Gujarat, as well as India as a whole. It is one of the most widely grown and consumed cereal grains globally, serving as a vital source of nutrition and income for millions of people. Here, we delve into the cultivation of wheat in Gujarat and its broader significance within India's agricultural sector.

India is one of the world's largest wheat producers, consistently ranking among the top three wheat-producing countries globally. The nation's diverse agro-climatic zones enable wheat cultivation throughout the year, with the *Rabi* season contributing the majority of the wheat yield. Wheat is grown extensively in the northern states of Punjab, Haryana and Uttar Pradesh, but its cultivation extends to other regions as well.

Gujarat, located in western India, boasts diverse agro-climatic conditions that are conducive to wheat cultivation. Farmers in Gujarat employ both traditional and modern farming practices to cultivate wheat. These methods encompass the use of improved wheat varieties, advanced irrigation techniques, and efficient post-harvest management.

Wheat cultivation in Gujarat and India is not only vital for ensuring food security but also plays a substantial role in the socio-economic fabric of the nation. Its cultivation provides sustenance to millions of people, supports rural livelihoods, and contributes significantly to India's agricultural and economic growth.

Frontline demonstrations are essential components of agricultural extension programs, serving as practical platforms for showcasing improved agricultural technologies to farmers (Rai *et al.*, 2020 and Desai *et al.*, 2021) [9, 2]. In Porbandar district, wheat is a crucial *Rabi* season crop, and enhancing its yield is of paramount importance to ensure food security and improve the livelihoods of local farmers. This study analyses the effectiveness of FLDs in improving wheat yield and the adoption of improved practices by farmers.

Materials and Methods

Krishi Vigyan Kendra, Porbandar of Gujarat state conducted frontline demonstrations on wheat variety GJW-463 from year 2018-19 to 2020-21 in different villages of the district. Total 30 demonstration were given in 12 ha area. Following steps were followed for FLDs.

Selection of FLD Sites: Several FLD sites were selected across the district, representing diverse agro-climatic conditions and farmer demographics.

Implementation of FLDs: Improved wheat cultivation practices, such as the use of high-yielding variety (GJW-463), proper seed rate, balanced nutrient management, were demonstrated to farmers at these sites.

Data Collection: Data on wheat yield, adoption of recommended practices, and farmers' feedback were collected over multiple cropping seasons.

Data Analysis: The data output was collected from both demonstrated plot as well as farmers practices and finally the extension gap, technology gap, technology index were workout (Samui *et al.*, 2000) [11] as given below:

Technology gap = Pi (Potential yield) – Di (Demonstration yield)

Extension gap = Di (Demonstration yield) – Fi (Farmers Yield)

Technology index (%) = (Technology gap / Potential yield) × 100

Results and Discussion

Yield Comparison

In the year 2018-19, farmers who implemented improved technologies achieved an average yield of 30.06 quintals per hectare (q/ha), representing a remarkable 16.51% increase compared to the prevailing farmer's practices.

The positive trend continued in 2019-20, with an average yield of 33.94 q/ha among technology adopters, which was 6.06% higher than the traditional practices.

The most significant impact was observed in the year 2020-21, where farmers using improved technologies recorded an impressive average yield of 49.75 q/ha, representing a substantial 12.75% increase compared to conventional farming methods.

Similar yield enhancement in different crops in FLDs has been reported by Prajapati *et al.* (2019) [8], Undhad *et al.* (2019) [12], Raj *et al.*, (2013) [10] and Poonia and Pithia (2011) [7].

Technology Gap

The technology gap, which represents the difference between the potential yield achievable through improved technologies and the actual yield under demonstrated practices, was substantial in all three years.

In 2018-19, the technology gap was 37.40 q/ha, indicating the untapped potential for yield improvement.

The technology gap remained high in 2019-20, at 33.52 q/ha, signifying a considerable opportunity for yield enhancement.

However, by 2020-21, there was a notable reduction in the technology gap to 17.71 q/ha, suggesting that more farmers had begun adopting improved technologies.

The technology gap may be due to the diffeneces in the soil fertility status and weather conditions (Mitra and Samajdar, 2010) [5].

Extension Gap

The extension gap, which represents the difference between the demonstration yield achieved through improved technologies and the actual yield of farmers check variety, provides insights into the effectiveness of technology dissemination.

In 2018-19, the extension gap was 4.26 q/ha, indicating that some farmers who adopted improved technologies did not fully realize their potential benefits.

The extension gap decreased in 2019-20 to 1.94 q/ha, suggesting an improvement in technology adoption and utilization.

However, it increased in 2020-21 to 5.62 q/ha, indicating the need for further efforts to ensure that all farmers who adopt improved technologies can maximize their yields.

The same finding was reported by Ali and Singh (2021) [1] in green gram and Hiremath and Nagaraju (2010) [3] in chili.

Technology index

The technology index shows the feasibility of the technology at the farmer's field. The lower the value of technology index more is the feasibility. Technology index was 55.44, 49.69 and 26.25 percent during the year 2018-19, 2019-20 and 2020-21, respectively.

These findings correspond with the findings of Mokidue *et al.* (2011) [6] and Jeengar *et al.* (2006) [4].

Table 1: Performance of recommended high yielding variety of wheat

Crop season	Variety Demonstrated	No. of Demonstration	Area	Yield (q/ha)		% Increase in Yield	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
				GJW-463	Local Check				
Rabi-2018-19	GJW-463	10	4	30.06	25.80	16.51	37.40	4.26	55.44
Rabi-2019-20	GJW-463	10	4	33.94	32.00	6.06	33.52	1.94	49.69
Rabi-2020-21	GJW-463	10	4	49.75	44.13	12.75	17.71	5.62	26.25

Potential yield of wheat var. GJW-463 is 67.46 q/ha

Conclusion

In conclusion, the adoption of improved technologies has led to substantial increases in wheat yield in Porbandar district. Frontline demonstrations have proven to be an effective approach for improving wheat yield and promoting the adoption of best practices among farmers in Porbandar district, Gujarat. However, addressing the extension gap and ensuring that all farmers can effectively utilize these technologies remain challenges that require ongoing attention. Efforts in this direction can contribute significantly to food security, agricultural sustainability, and the economic prosperity of farmers in the region.

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