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Impact of frontline demonstrations of wheat (*Triticum aestivum* L.) improved variety GW-451 on yield in Porbandar district of Gujarat state

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Abstract

Wheat (*Triticum aestivum* L.) is one of the major cereal crop of *Rabi* season in district of Porbandar. The present investigation was done by Krishi Vigyan Kendra, Junagadh Agricultural University, Khapat, Porbandar in its adopted villages. Front line demonstrations of varietal evaluations of wheat variety GW-451, were conducted at 30 farmers' fields under 12 ha for three years. GW 451 was developed by Wheat Research Station, SDAU, Vijapur. The variety is recommended for irrigated, timely sown conditions in Gujarat state. The variety has resistance to black and brown rust. It also had better nutritional qualities with 36.4 ppm Fe and 40.1 ppm Zn content which will be useful in combating malnutrition. It has good grain quality. The performance of new high yielding variety was assessed in terms of the yield comparing with the local varieties and farmers practices. The improved technologies recorded a mean yield of 52.75, 48.63 and 43.50 q/ha during year 2021-22, 2022-23 and 2023-24, respectively which was 9.64, 10.45 and 11.21 percent higher as compared to prevailing farmers' practice. The average percent increase of three years in yield was recorded 10.43 percent in demonstrated plot. The performance parameters *viz.*, technology gap, extension gap and technology index values were found 17.71 q/ha, 4.50 q/ha and 26.83 percent, respectively. Results depicts that the FLD is a successful tool to enhance the production and productivity of wheat crop through improve knowledge of farmers about improved variety of chickpea and its cultural practices.

Keywords: Front line demonstrations (FLDs), wheat, GW-451

Introduction

Wheat is second most important staple food crop after rice in India and generally provides about 50 percent of the calories and proteins requirement to a vast majority of India's population. Increased population together with eating preferences has resulted in a considerable upsurge in mandate for wheat in last 50 years (Kajla *et al.*, 2015) [5]. The major wheat producing states are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, Maharashtra, Gujarat, Karnataka, West Bengal, Uttarakhand, Himachal Pradesh, and Jammu and Kashmir. These states contribute about 99.5% of total wheat production in the country. Remaining states contributes only 0.5% of total wheat production in the country. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different micro farming situations in a district (Das, 2007) [2]. Front Line Demonstration (FLD) is considered one of the most powerful tools for transfer of technology, as it establishes production potential of various crops and enterprises on farmers field through "Learning by doing and Seeing is believing". In Porbandar district, wheat is a crucial *Rabi* season crop. Keeping these in view, FLDs of improved variety of wheat GW 451 were conducted to enhance the yield and economic returns and also to identify the constraints related to improved production technologies in wheat crop.

Materials and Methods

Krishi Vigyan Kendra, Porbandar of Gujarat state conducted frontline demonstrations on wheat variety GW-451 from year 2021-22 to 2023-24 in different villages of the district. Total 30 demonstrations 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 (GW-451), proper seed rate, balanced nutrient management, were demonstrated.
- **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 2021-22, farmers who implemented improved technologies achieved an average yield of 52.75 quintals per hectare (q/ha), representing a remarkable 9.64% increase compared to the prevailing farmer's practices. The positive trend continued in 2022-23, with an average yield of 48.63 q/ha among technology adopters, which was 10.45% higher than the traditional practices.

The significant impact was observed in the year 2023-24, where farmers using improved technologies recorded an average yield 43.50 q/ha, representing a substantial 11.21% increase compared to conventional farming methods (Table-1). Similar yield enhancement in different crops in FLDs has been reported by Savaliya *et al.* (2024) [12], Kumar *et al.* (2023) [6], Prajapati *et al.* (2019) [9] and Undhad *et al*. (2019) [15].

Technology Gap

Technological gap has been defined as the proportion of gap in the adoption of practices recommended and it is expressed in percentage. Here, the technology gap shows the difference between demonstration yield and potential yield. The technology gap was recorded 13.25, 17.37 and 22.50 q/ha for the year 2021-22, 2022-23 and 2023-24, respectively. The technology gap may be due to the differences in the soil fertility status and weather conditions (Mitra and Samajdar, 2010) [7]. This finding is found in corroboration with the findings of Savaliya *et al.* (2024) [12], Singh *et al.* (2017) [14] and Sharma *et al.* (2016) [13].

Extension gap

The extension gap measured from the difference between demonstration variety yield and Local variety yield. The extension gap was recorded 4.62 q/ha in the year 2021-22, 4.50 q/ha in the year 2022-23 and 4.37 q/ha in the year 2023-24 (Table-1). This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology. This finding is found in corroboration with the findings of Savaliya *et al.* (2024) [12], Singh *et al.* (2017) [14], Sharma *et al.* (2016) [13], Ali and Singh (2021) [1] in green gram and Hiremath and Nagaraju (2010) [3].

Technology index

The technology index shows the feasibility of the technology at the farmers' field. The lower the value of technology index more is the feasibility. The average technology index was 26.83 percent, while it was 20.08 percent during 2021-22, 26.32 percent during 2022-23 and 34.09 percent during 2023-24 (Table-1). These findings correspond with the findings of Savaliya *et al.* (2024) [12], Rai *et al.* (2020) [10], Singh *et al.* (2017) [14], Sharma *et al.* (2016) [13], Mokidue *et al.*, (2011) [8] and Jeengar *et al.* (2006) [4].

Fig 1: Wheat variety GW-451 field

Table 1: Performance of wheat variety GW-451

Crop season	Variety Demonstrated	No. of Demonstration	Area	Yield (q/ha)		% Increase in Yield	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
				GW-451	Local Check				
Rabi-2021-22	GW-451	10	4	52.75	48.13	9.64	13.25	4.62	20.08
Rabi-2022-23	GW-451	10	4	48.63	44.13	10.45	17.37	4.50	26.32
Rabi-2023-24	GW-451	10	4	43.50	39.13	11.21	22.50	4.37	34.09
Average				48.29	43.80	10.43	17.71	4.50	26.83

Potential yield of wheat var. GW-451 is 66.00 q/ha

Conclusion

The study revealed a significant gap in wheat yield between demonstration plots and farmers' local variety in Porbandar district, due to technology and extension gaps. The improved GW-451 variety of wheat showed a 10.43 percent increase in yield compared to the local variety. This indicates that the GW-451 variety is effective in enhancing wheat yield.

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