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Research Article

# DISSEMINATION OF IMPROVED PUMPKIN VARIETY AND ITS PRODUCTION TECHNOLOGY THROUGH DEMONSTRATIONS IN MIRZAPUR DISTRICT OF *VINDHYAN* REGION

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**Abstract-** The yield of pumpkin under demonstration was recorded 343.6 q. /ha. The yield enhancement due to technological intervention was to the tune of 7.86 % over control. The technology gap, technology index and extension gap were 106.4 kg, 23.63 per cent and 27 quintal per hectare, respectively. The Gross return, cost of cultivation and net return of Pumpkin FLDs were Rs. 140523/-, Rs. 21532/- and Rs. 1, 18,901/-, respectively.

**Keywords-** Pumpkin, Profitability, Production Technology, Frontline Demonstrations, Technology gap, Extension gap, Technology index, Net return

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## Introduction

Uttar Pradesh is the second largest producer of vegetables in the country after West Bengal. The major vegetables grown in Uttar Pradesh are peas, chillies, okra, tomato, brinjal, cauliflower, cabbage, spinach, melon, radish, carrot, turnip and a very good range of cucurbits. Mirzapur district is one of the most backward and disadvantaged districts of Uttar Pradesh which is situated on the far south-east region of the state among the Vindhyan Mountain range .The district is said to be disadvantaged mainly because of the scarcity of water along with some other major reasons like lack of knowledge about the recently evolved technologies in agriculture, lack of expertise to indulge in vegetable based cropping system or diversified agriculture, inappropriate use of farm inputs like fertilizers & pesticides and poor utilization of natural resources. During recent years, Pumpkin and bottle gourd have emerged as the two chief vegetable crops among cucurbits in Mirzapur district. Pumpkin is one of the most important among the cucurbits having high nutritional value. It has been used frequently as a functional food or medicine [1]. Many other countries, such as the former Yugoslav republics, Argentina, India, Brazil and America also use pumpkins traditionally as medicine for diabetes [2, 3]. It provides food in a short period and adjusts well during kharif sowing under rainfed farming conditions. Pumpkin is relatively high in energy and carbohydrates and a good source of vitamins, especially high carotenoid pigments and minerals [4, 5]. Such nutritional features combined with yield potential make pumpkin a nutrients rich crop to address the emerging challenges of food related health issues in the area. Farmers of the area preferred pumpkin as a suitable alternative in kharif as well as in summer season (only few who have irrigation facility) over the traditional field crops which were quite prevalent in the area. However, the productivity of pumpkin in the district was very low as it was generally cultivated by the farmers using either no improved production technology or using it at suboptimal levels. Farmers cultivating pumpkin continued to face uncertain and low economic returns whenever production fell and even sometimes when production increased (due to fluctuating/uncertain market prices). Lack of suitable high yielding varieties as well as poor knowledge about production practices were attributed as main reasons for low productivity of pumpkin in the district. Using a suitable high yielding variety with an early sowing could play effective dual role both in increasing the productivity and also getting higher returns for their produce because of the early arrival in market. The technology development with regard to improved varieties and other inputs have played important role in raising productivity. [6] The productivity of pumpkin per unit area could be increased further by adopting recommended scientific and sustainable package of practices. Available agricultural technology does not serve its purpose till it reaches and adopted by its ultimate users i.e. the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users [7]. One of the major functions of Agricultural Scientists and Extension workers is disseminating useful and practical information obtained through research to farmers. The efficient and effective ways to do this among others is through well-planned and carefully organized Frontline Demonstrations. The on-farm FLDs serve as one of the most effective Extension Education tools ever developed for transfer of technology because the technologies are demonstrated for the first time by the scientists themselves before being fed into the main extension system of the State Department of Agriculture. Although planning and executing FLDs require considerable time and

effort, the payback comes when farmers readily adapt practices they perceive to be appropriate under local conditions. Mutsaers, *et al*., 1986 [8] developed field guides for on-farm research. They insisted on the involvement of farmers in constraint identification and technology development. In view of the importance of demonstrations in crop productivity and continuously getting feedback of problems and constraints faced by the farmers, front line demonstrations with full skill and knowledge with scientists were taken up in pumpkin also. Conducting front line demonstrations on farmers' field helped to identify the constraints and potential of the pumpkin in the specific area in realizing the food security as well as in improving the economic and social status of the study area. The aim of the front-line demonstrations was to convey the scientific and technical message to growers that if they use recommended package and practices then the yield of this crop could easily be manifolds than its present level. Major emphasis in the adoption of new technology was on high yielding variety, an early sowing, timely cultural practices and need based use of agro-chemicals. There was ample scope for further improvement of production and productivity of pumpkin for raising the income level of the farming community of the district. Yield loss under real farming condition could be attributed to several biotic and abiotic factors. The basic survey made in the selected blocks of the district clearly indicated the significant technology and economic gap among the farmers. Taking into account the above considerations, frontline demonstrations were carried out in a systematic manner on farmers' field with a broad objective to show the worth of a new variety and convince farmers to adopt improved production management practices for enhancing productivity of pumpkin while the precise objectives were:

1. To assess the dissemination of recommended technology and adoption of a new variety; and
2. To give an idea about the profitability of pumpkin cultivation.

## Methodology

The research work has been done in Patehra block of Mirzapur district under sub-project of National Agricultural Innovation Project entitled "Ensuring livelihood security through watershed-based farming system modules in disadvantaged districts of Mirzapur and Sonbhadra in Vindhyan region". Indian Institute of Vegetable Research, Varanasi had conducted a total of 54 demonstrations under real farming situations to convince the growers about potentialities of improved variety of pumpkin "Kashi Harit" in kharif 2011 in the study area with active participation of 54 farmers. Selection of the farmers was done on the basis of their exposure to vegetable farming. The minimum area under each demonstration was 0.1 ha. All other steps like site and farmer selection, layout of demonstration, farmers' participation etc were followed as suggested [9]. Data for farmers' practice is obtained from the same 54 farmers with local cultivar raised through indigenous methods on different plots. The study was based on the primary data which were collected through a well prepared and pre-tested schedule of enquiry by interview method during the cropping period from the growers who participated in the demonstrations. To popularize the new variety and improved production practices, well before the conduct of demonstrations, constraints in pumpkin production were identified through field survey, farmers meeting and field diagnostic visits during the cropping period and frontline demonstrations were planned accordingly. Preferential ranking technique was employed to identify the constraints faced by the respondents in pumpkin production. Growers were asked to rank the constraints they observe as limiting factor in pumpkin production in the area. The conversion of data in quantity form was achieved by calculating the Rank Based Quotient (RBQ) as given [10] which is as follows:

$$R.B.Q. = \frac{\Sigma fi(n+1-i)}{N \times n} \times 100$$

Where,

fi = Number of farmers reporting a particular problem under ith rank

N = number of farmers

n = number of problems identified

To manage assessed problems, improved and recommended technologies were followed as intervention during the course of frontline demonstrations programme. Package and farmers' existing practices are given in [Table-1].

**Table-1** *Comparison between demonstration package and farmers' existing practices*

| S. No. | Particulars | Pumpkin FLD | |
|---|---|---|---|
| | | Demonstration Package | Farmers' Practice |
| 1. | Variety | Kashi Harit | Some local cultivar |
| 2. | Sowing time | First week of June | Last week of June/Onset of mansoon |
| 3. | Sowing method | In poly packets and transplanted to field after about 25 days | Direct sowing in field |
| 4. | Fertilizer dose | NPK as 60:60:50/ha + application of plant tonic | NPK as 70:90:60/ha with no other plant tonic |
| 5. | Plant protection | Need based application of agro-chemicals | Indiscriminate use of costly agro-chemicals |
| 6. | Weed management | 1 hoeing + 1 weeding at 15 days after planting of seedlings | These operations were not carried out |

To study the impact of frontline demonstrations, yield data was collected from control (Farmers' practice) and demonstration plots and cost of cultivation, net income and benefit-cost ratio were computed and analyzed. The technology gap, extension gap and technology index were calculated using the following formulas as given by [11]

Technology gap = Potential yield – Demonstration yield

Extension gap = Demonstration yield- Farmers yield

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

An attempt was also made to assess the knowledge and adoption level of participating growers on various aspects of improved pumpkin production practices by computing the number of farmers who gained adequate knowledge and adopted each of the six packages of practices on pumpkin. Further, the satisfaction level of respondent farmers about the execution of frontline demonstrations was also measured on the basis of several criteria such as training of participating farmers, supply of inputs, solving field problems through regular visits and advisory services, timely availability of resource persons, performance of variety demonstrated and overall impact of FLDs. Client Satisfaction Index was calculated as developed [12].

$$\text{Client Satisfaction Index} = \frac{\text{Individual obtained score}}{\text{Maximum score possible}} \times 100$$

The data thus collected were tabulated and statistically analyzed to interpret the results.

## Result and Discussion

### Constraints in Pumpkin Production

Farmers' pumpkin production problems were documented in this study. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in pumpkin production. The ranking specified by the different farmers are given in [Table-2] which indicates that lack of suitable HYV was given the top most rank by 28 respondent farmers.

**Table-2** *Ranks given by farmers for different constraints*

| S. No. | Constraints | Ranks | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII |
| 1. | Lack of suitable HYV seeds | 28 | 8 | 8 | 4 | 2 | 2 | 2 |
| 2. | Inadequacy of farm inputs | 4 | 12 | 8 | 2 | 8 | 14 | 6 |
| 3. | Unavailability and high cost of labour | 2 | 6 | 8 | 14 | 10 | 6 | 8 |
| 4. | Wild animals | 0 | 2 | 14 | 12 | 6 | 4 | 16 |
| 5. | Weed infestation | 4 | 14 | 8 | 8 | 6 | 10 | 4 |
| 6. | High cost of agro-chemicals | 2 | 0 | 4 | 8 | 16 | 10 | 14 |
| 7. | Pest infestation | 14 | 12 | 4 | 6 | 6 | 8 | 4 |

Based on the ranks given by the respondent farmers for the different constraints listed out in [Table-2], the rank-based quotients were calculated and presented in [Table-3]. The analysis of data presented in the [Table-3] revealed that lack of suitable HYV was the major constraint faced by the growers followed by pest infestation. It was quite obvious because of the existence of red pumpkin beetle in the area. Other constraints such as weed infestation, inadequacy of farm inputs, unavailability and high cost of labour were found to reduce pumpkin production. Among all the constraints, wild animals and high cost of agro-chemicals got least concerns.

**Table-3** *Details of R.B.Q. values for different constraints*

| S.No. | Problems | R.B.Q. | Overall Rank |
|---|---|---|---|
| 1. | Lack of suitable HYV seeds | 82.54 | I |
| 2. | Inadequacy of farm inputs | 54.50 | IV |
| 3. | Unavailability and high cost of labour | 51.85 | V |
| 4. | Wild animals | 45.50 | VI |
| 5. | Weed infestation | 59.79 | III |
| 6. | High cost of agro-chemicals | 39.15 | VII |
| 7. | Pest infestation | 66.67 | II |

**Performance of FLD**

In the present evaluation study, the data on output of pumpkin cultivation were collected from FLD plots. Besides, the data on local practices commonly adopted by the farmers of this region were also collected to make a comparison of performance levels between demonstrated variety and local checks. The yield performance and economic indicators are presented [Table-4]. The data revealed that under demonstration plots, the performance of pumpkin yield was found to be higher than that under local check during the study period (2010 and 2011). The yield of pumpkin under demonstration was recorded as 343.6 q/ha. The yield enhancement due to technological intervention was to the tune of 7.86 % over control. Yield enhancement in different crops in Front Line Demonstration has also been documented [13- 19]. Though the yield difference from local check was not substantially higher, still a big difference in B:C ratio was observed mainly because earlier farmers were usually growing big size fruit varieties which shared less market price whereas, Kashi Harit being small sized variety fetched higher market price because of its dimensions and keeping quality. Another important reason for getting higher price was the very early arrival of the produce because of raising saplings in poly packets much before the actual onset of monsoon. From these results it is evident that the performance of improved variety was found better than the local check under local conditions. Farmers were motivated by results of agro technologies applied in the FLDs trials and it is expected that they would adopt these technologies in the coming years. Estimated of yield gap between yield of demonstration on farmers field and potential yield (experimental) compared and further analysed to find out technological index. It indicates the gap in the demonstration yield over potential yield and which was 106.4 kg/ha. The observed technology gap may be attributed to dissimilarities in soil fertility, salinity and erratic rainfall and other vagaries of weather conditions in the area. Hence, to narrow down the technology gap of demonstrated variety, location specific recommendation appears to be necessary [20, 21]. Technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index more is the feasibility. [Table-4] revealed that the technology index value was 23.63 %. The extension gap of 27 q./ ha during the period of study emphasized the need to narrow down the yield gap by extension activity there is need to educate the farmers which strengthen their knowledge for application of improved agronomic management practices. The new technologies will eventually lead to the farmers to discontinuance of old varieties with the new technology. The finding of the present study is in line with the findings [22, 23].

**Table-4** Yield performance Yield gaps, Technology Index and economics of pumpkin cv. Kashi Harit as grown under FLD and existing practices.

| Cost of Cultivation (Rs./ha) | | Yield (q/ha) | | % increase over existing | Extension gap (q/ha) | Technology gap (q/ha) | Technology index (%) | B-C ratio | |
|---|---|---|---|---|---|---|---|---|---|
| FLD | EP | FLD | EP | | | | | FLD | EP |
| 21,532 | 20,500 | 343.6 | 316.6 | 7.86 | 27.0 | 106.4 | 23.63 | 5.50 | 4.35 |

The economics of pumpkin production under front line demonstrations were estimated and the results have been presented in [Table-4]. Economic analysis of the yield performance revealed that front line demonstrations recorded higher gross returns (Rs. 1, 40,523/ ha) and net return (Rs. 1, 18,991/ ha) with higher benefit ratio (5.50) compared to local checks suggesting the higher profitability and economic viability of the demonstration. These results are in line with the findings of [24,25].

**Farmers' Satisfaction**

The extent of satisfaction level of respondent farmers over extension services and performance of demonstrated variety was measured by Client Satisfaction Index (CSI) and results presented in [Table-5].

**Table-5** *Extent of farmers' satisfaction of extension services rendered*

| Satisfaction Level | Number | Percent |
|---|---|---|
| Low | 13 | 24.07 |
| Medium | 23 | 42.59 |
| High | 18 | 33.33 |

It is observed from [Table-5] that majority of the respondent farmers expressed medium (42.59 %) to the high (33.33 %) level of satisfaction for extension services and performance of technology under demonstrations. Whereas, very few (24.07) percent of respondents expressed lower level of satisfaction. The results are in conformity with the results of [26]. The medium to higher level of satisfaction with respect to services rendered, linkage with farmers, and technologies demonstrated etc. indicate stronger conviction, physical and mental involvement in the frontline demonstration which in turn would lead to higher adoption. This shows the relevance of frontline demonstration.

**Conclusion**

Pumpkin has emerged as the chief vegetable crop among cucurbits having high nutritional value in the Mirzapur district. Economic analysis of the yield revealed that frontline demonstrations recorded higher gross returns (Rs. 1,40,523 /ha) and net return Rs.1,18,901/ ha) with higher benefit ratio (5.50) compared to local checks suggesting the higher profitability and economic viability of the demonstration. The yield of pumpkin under demonstration was recorded as 343.6q/ha. The yield enhancement due to technological intervention was to the tune of 7.86 % over control. The technology gap shows the gap in the demonstration yield over potential yield and which was found to be 106.4 kg/ ha. The technology index value was 23.63 %. The major lack of suitable HYV was the major constraint faced by the growers followed by pest infestation. It was quite obvious because of the existence of red pumpkin beetle in the area. Other constraints such as weed infestation, inadequacy of farm inputs, unavailability and high cost of labour were found to reduce pumpkin production.

**Application of Research:** Finding may be used by different stakeholder such as biological scientist, policy maker, planner administrator & bureaucrats for further the technological design and policy interventions.

**Research Category:** Applied Research

**Abbreviations**:
B:C ratio: Benefit –Cost ratio
EP: Existing practices
FLD: Fontline Demonstration
Ha: hectare
HYV: High Yielding Varieties

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**References**

[1] Saganuwan A.S. (2009) *Journal of Herbs, Spices & Medicinal Plants*, 15, 24-44.
[2] Fu C., Shi H. and Li Q. (2006) *Plant Foods for Human Nutrition,* 61, 73–80.
[3] Fu C.T.H., Cai T., Liu Y. and Li Q. (2007) *Food Chemistry*, 100, 944–947.
[4] Bose T.K. and Som M.G. (1998) *Naya Prokash, Calcutta, India*, 92-95.
[5] Tindall H.D. (2001) *Macmillan Education, London*, 166.
[6] Singh N.B. (2003) *National Seminar on advances in Genetics and Plant Breeding, October 30-31, 2003 at UAS, Dharwad, Karnataka*.
[7] Prasad C., Chaudhary B.N. and Nayar B.B. (1987) *First Line Transfer of Technology Project, ICAR, New Delhi*, 87.
[8] Mutsaers H.J.W., Fisher N.M., Vogel W.O. and Palada M.C. (1986) *IITA, Ibadan*,197.
[9] Choudhary B.N. (1999) Publication Division of Agricultural Extension, ICAR, 73-78.
[10] Sabarathanam V.E. (1988) *Manuals of Field Experience Training for ARS Scientists, NAARM, Hyderabad*.
[11] Samui S.K., Maitra S., Roy D.K., Mondal A.K. and Saha D. (2000) *Indian J. Soc.* Coastal *Agric. Res.,*18(2),180-183.
[12] Kumaran M. and Vijayaragavan K. (2005) *Indian J. Ext. Edu.,* 4(3&4), 8-12.
[13] Haque M.S. (2000) *M.J. Ext. Edu.*, 19(1), 22-27.
[14] Tiwari K.B. and Saxena A. (2001) *Bhartiya Krishi Anusandhan Patrika*, 16(3&4), 185-189.
[15] Tiwari R.B., Singh V. and Parihar P. (2003) *Maha. J. Ext. Edu*., 22(1),19-20.
[16] Tomer L.S., Sharma P.B. and Joshi K. (2003) *Maha. J. Ext. Edu.,* 22(1), 15-18.
[17] Hiremath S.M., Nagaraju M.V. and Shashidhar K.K. (2007) *National Seminar Appropriate Extn. Strat. Manag. Rural Resources, Univ. Agric. Sci., Dharwad, December* 18-20,100.
[18] Mishra D.K., Paliwal D.K.,Tailor R.S. and Deshwal A.K. (2009) *Indian Res. J. Ext. Edu*., 9(3), 26-28.
[19] Kumar A., Kumar R., Yadav V.P.S. and Kumar R. (2010) *Indian Res. J. Ext. Edu*, 10(1), 105-108.
[20] Sharma V.,Kumar,V.,Sharma S.C. and Sharma S.(2016) *Journal of applied and Natural Science,* 8(1), 423-428.
[21] Tiwari B.K, Sharma A., Sahare K.V., Tripathi P.N. and Singh R.R. (2014) *Plant Archives*,14(1),495-498.
[22] Sawardekar S.V., Dhane S.S., Jadhav B.B. (2003) *IRRN*, 28, 73-74.
[23] Gurumukhi D.R. and Mishra S. (2003) *Agriculture Extension Review*, 15(4), 22-23.
[24] Hiremath S.M. and Nagaraju M.V. (2009) *Karnataka J. of Agric. Sci,*22(5), 1092-1093.
[25] Prakash A., Singh H.N., Shekhawat R.S. and Sandhu S. (2017) *Journal of Economics, Management and Trade*,18(4),1-7.
[26] Narayanaswamy C. and Eshwarappa G. (1998) *Indian J. Ext. Education,* 34(1&2), 14-15.