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Technological gap in improved carrot production technology by the farmers of Patan district

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Abstract
India's diverse climate ensures availability of all varieties of fresh fruits & vegetables. India ranks second in fruits and vegetables production in the world, after China. As per National Horticulture Database published by National Horticulture Board, during 2019-20, India produced 99.07 million metric tons of fruits and 191.77 million metric tons of vegetables. The area under cultivation of fruits stood at 6.66 million hectares while vegetables were cultivated at 10.35 million hectares. The carrot (*Daucus carota* L.) belongs to the family Apiaceae. Carrots are particularly rich in carotene. They are consumed either fresh, as a salad crop or cooked. A study was conducted in Patan district of Gujarat state. Patan taluka was purposively selected because carrot crop was extensively cultivated in this taluka. Eight villages from Patan taluka were selected purposively in which carrot crop was extensively grown. Thus, total 160 farmers have been selected for the study and were interviewed with a structural pre-tested interview schedule. Ex-post facto research design was followed for carrying out the study. The result clearly indicated that 55.63 per cent carrot growers had medium technological gap. Whereas, the practices wise technological gap (above 60 %) was observed in varieties grown and seed treatment. The technological gap (up to 30 %) was found in stage of harvesting and time of sowing.

Keywords: technological gap

Introduction
Carrot is believed to have originated in Afghanistan which remains the centre of diversity of *D. carota*. They were known to the Greeks and the Romans and their early use was mainly medicinal, to cure stomach problems and treat wounds, ulcers, and liver and kidney ailments.
The carrot (*Daucus carota* L.) belongs to the family Apiaceae. It is related to celery, celeriac, coriander, fennel, parsnip and parsley, which are all members of this family. The carrot originated in Asia. Initially the roots were long and thin, and either purple or yellow in colour. These colours, as well as white and orange, still exist, with the orange or orange-red colours being by far the most popular today. The plant is a biennial, i.e. it grows vegetatively in the first season and produces seed in the second. For root production the plant is grown as an annual. Low temperatures, as well as various stress factors, will sometimes cause flower production to be initiated, particularly in certain selections of some varieties. Bolting to seed in spring is possible in carrot plantings grown over the winter period. Carrots are said to be rich in ß-carotene, dietary fiber, antioxidants and minerals. Commercial yields for large carrots average between 20 to 40 tonnes per hectare, although 60 tone or more are sometimes obtained by successful farmers. Baby carrot yields are generally about half those of large carrots.
The area under carrot in Patan district was 645 hectares with a production about 15,738 Tones and productivity of 24.40 t/ha during 2016-17. Thus, the average yield of carrot in the district was lower in comparison to its potential yield 59 t/ha (Anonymous, 2013) [1].

Objectives
- To find out the technological gap in improved carrot production technology among the carrot growers

Methodology
The present study was undertaken in Patan district. The study was confined to ex post facto research design as the independent variables have already operated in the study area. A multistage random sampling technique was used for present study. Patan taluka was purposively selected because carrot is cultivated only in this taluka. Eight villages from Patan taluka were selected purposively in which area under carrot crop was maximum. From each

village 20 farmers was selected randomly from the prepared list of carrot growers. Thus, total sample was 160 respondents. The data were collected by personal contact method with the help of structured interview schedule and collected data were coded, classified, tabulated and analyzed in light of objectives and in order to make the findings meaningful for drawing meaningful interpretation.

Result and Discussion

Overall technological gap in the improved carrot production technology

The technological gap index of a particular practice expressed in percentage was:

$$\text{Technological gap index} = \frac{I - A}{I} \times 100$$

Where,
I = Improved practice
A = practices actually adopted by the respondents

On the basis of score obtained by the carrot growers, they were grouped in to three categories *viz*., (i) low level (ii) medium level (iii) high level technological gap. The data regarding this aspect are presented in Table 1.

Table 1: Distribution of respondents according to their overall technological gap of the carrot growers

Sr. No.	Technological gap	Frequency	Per cent
1.	Low level (Upto 26.36 score)	28	17.50
2.	Medium level (26.37 to 45.74 score)	89	55.63
3.	High level (Above 45.74 score)	43	26.87
Total		160	100.00
Mean =36.05, SD = 9.69			

The data in Table 1 clearly indicated that 55.63 per cent carrot growers had medium level technological gap, followed by high level (26.87 %) and low level (17.50 %) technological gap in carrot cultivation technology, respectively.
The possible reason for this might be that the farmers could not get the message of improved package of practices in time in acceptable form. Further, farmer might have tried their best to use and adopt the carrot cultivation but some constraints might have hindered them to do so, and hence technological gap might have been observed.
The finding is in agreement with the findings of Pandey *et al.* (2018) [4].

Practices wise technological gap in improved carrot production technology

The data presented in Table 2 indicate that the practices wise technological gap in improved carrot production technology

Table 2: Practices wise technological gap in improved carrot production technology of the carrot growers

Sr. No.	Practices	Adoption (%)	Technology gap (%)	Rank according to technological gap
1.	Varieties grown	00.00	100.00	I
2.	Seed rate	44.37	55.63	III
3.	Time of sowing	91.25	8.75	XIII
4.	Seed treatment	21.87	78.13	II
5.	Spacing	51.87	48.13	IV
6.	FYM	56.25	43.75	V
7.	Chemical fertilizers	57.37	42.63	VII
8	Irrigations	69.38	30.62	XI
9.	Weeding and interculturing	59.37	40.63	IX
10.	Weedicide	60.62	39.38	X
11	Insect/Pest control	56.87	43.13	VI
12.	Diseases control	58.75	41.25	VIII
13.	Stage of harvesting	71.25	28.75	XII
Overall Technological gap		53.79	46.21	

The data presented in Table 2 revealed that the technological gap (above 50 %) was observed in varieties grown 100.00 per cent, followed by seed treatment 78.13 per cent, seed rate 55.63 per cent. The medium technological gap (30.00 to 50.00 %) was observed in spacing 48.13 per cent, FYM 43.75 per cent, insect/pest control 43.13 per cent, chemical fertilizers 42.63 per cent, disease control 41.25 per cent, weeding and interculturing 40.63 per cent, use of weedicide 39.38 per cent, irrigations 30.62 per cent. The low (up to 30 %) technological gap was found in stage of harvesting 28.75 per cent and time of sowing 8.75 per cent.

Conclusion

It was clearly indicated that 55.63 per cent carrot growers had medium level technological gap, followed by high level technological gap (26.87 %) and low-level technological gap (17.50 %) in improved carrot production technology.
In Practices wise technological gap (above 60 %) was observed in varieties grown 100.00 per cent and seed treatment 78.13 per cent, The technological gap (up to 30 %) was found in stage of harvesting 28.75 per cent and time of sowing 8.75 per cent.

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