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# Technological gap in cultivation of onion crop

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**Abstract**

Onion is a vital crop contributing significantly to both food security and farmers' income. Rich in vitamins, minerals, and antioxidants like quercetin, onions have notable medicinal value including benefits for heart health and blood sugar regulation. In India, particularly in regions like Nashik, onions serve as a crucial cash crop supporting rural livelihoods. The present study was conducted to assess the profile of onion growers, identify the technological gap in onion cultivation practices, evaluate individual technological gaps, examine the constraints faced by farmers, and gather suggestions for improvement.

A study on the technological gap in onion cultivation revealed that a majority of onion growers (55.62 per cent) fell into the medium technological gap category, followed by those in the high (34.38 per cent) and low (10.00 per cent) categories. Several factors contributed to this gap, including the illiteracy of 5 per cent of growers, low to medium levels of management (38.75 per cent) and risk orientation, and moderate experience and extension contact. These constraints limited the adoption of recommended cultivation practices, leading to a significant proportion of farmers experiencing a high technological gap in onion production.

**Keywords:** Technological gap, onion growers, Nashik

## Introduction

Vegetable cultivation in India is an age-old practice that contributes significantly to income generation, employment, food security, and cropping system diversification. Among the wide variety of vegetables grown across India, onion (*Allium cepa L.*) stands out as a crucial bulb crop, valued for its culinary, nutritional, and medicinal properties. Known by regional names such as *kanda, piyaz, palandu* and others, onions are consumed in both green and mature forms and serve as a staple in Indian kitchens.

India grows onions across diverse agro-climatic zones, primarily in the rabi season. However, due to poor storage facilities and financial constraints, farmers often sell produce immediately after harvest, leading to seasonal market gluts and extreme price fluctuations—from under ₹1/kg to over ₹200/kg. Despite a consistent year-round demand, production remains inconsistent, often exploited by middlemen, affecting both farmers and consumers.

Onions are rich in sulphur compounds like allyl propyl disulphide, as well as quercetin, a powerful antioxidant. They are known to reduce blood sugar and cholesterol, aid digestion, and have anti-inflammatory and anti-cancer properties. Onions are consumed fresh, dehydrated, or processed, and form an essential part of many dishes worldwide.

Optimal onion production requires suitable temperature (13–24 °C for growth; 15–30 °C for bulbing), fertile well-drained soils, proper irrigation, and timely nutrient and pest management. Despite technological advances and the release of high-yielding varieties by institutions like Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, productivity remains below potential due to poor adoption of improved practices.

This study focuses on assessing the technological gap in onion cultivation in the major producing region of Nashik district, Maharashtra, covering tehsils like Nashik, Igatpuri, Niphad, and Sinnar. The study aims to understand farmers' profiles, identify gaps in technology adoption, explore constraints, and recommend strategies to bridge the knowledge and adoption divide for sustainable onion production.

## Methodology

The study was carried out in Nashik district where maximum area under onion cultivation observed. Four tehsils were selected on the basis of maximum area under onion cultivation. Accordingly, Nashik, Igatpuri, Niphad, Sinnar tehsils were selected for the study. Two villages from each tehsil were selected on the basis of maximum area, production and productivity they were Vadangali, Shaha, Janori, Nandurvaidya, Vinchur, Mahajanpur, Jakori, Palse. From each village 20 respondents were selected randomly to comprise total 160 respondents for the study.

Various tools and techniques used in the data collection: Designing of interview schedule, Pre-testing of interview schedule, Collection of data, Processing of data

The present research study comes within the purview of survey research mainly to "ex-post facto" in nature. In the light of the objectives and scope of the study, decisions were taken on the techniques of investigation, research materials and tools to be used and patterns of statistical analysis to be incorporated arbitory.

On the basis of maximum and minimum score obtained by the individuals, they were categorised in low, medium and high categories after following the range method.

## Results and Discussion

The findings of the study had been presented under the following headings.

### Technological Gap in Onion Cultivation Technology

**Table 1:** Distribution of Onion Growers according to Technological Gap

| Sl. No. | Technology | Complete | Partial | Never | Total |
|---|---|---|---|---|---|
| 1 | **Type of land** | | | | |
| | Medium | 76 (47.50) | 44 (27.50) | 40 (25.00) | 160 100.00) |
| | Good | 52 (32.50) | 58 (36.25) | 50 (31.25) | 160 (100.00) |
| | Well drained | 64 (40.00) | 52 (32.50) | 44 (27.50) | 160 (100.00) |
| 2 | **Land Preparation** | | | | |
| | Ploughing (5-6 inch) | 54 (33.75) | 56 (35.00) | 50 (31.25) | 160 (100.00) |
| | 2-3 harrowing | 62 (38.75) | 46 (28.75) | 52 (32.50) | 160 (100.00) |
| | FYM (40 tone)/ha | 68 (42.50) | 50 (31.25) | 42 (26.25) | 160 (100.00) |
| 3 | **Sowing** | | | | |
| | Kharif | 56 (35.00) | 50 (31.25) | 54 (33.75) | 160 (100.00) |
| | Rabi | 66 (41.25) | 56 (35.00) | 38 (23.75) | 160 (100.00) |
| | Summer | 48 (30.00) | 62 (38.75) | 50 (31.25) | 160 (100.00) |
| 4 | **Selection of Seed** | | | | |
| | Previous year | 58 (36.25) | 54 (33.75) | 48 (30.00) | 160 (100.00) |
| | From Onion research centre | 48 (30.00) | 60 (37.50) | 52 (32.50) | 160 (100.00) |
| | Agril. University | 58 (36.25) | 52 (32.50) | 50 (31.25) | 160 (100.00) |
| | KVK | 42 (26.25) | 60 (37.50) | 58 (36.25) | 160 (100.00) |
| | Other | 54 (33.75) | 50 (31.25) | 56 (35.00) | 160 (100.00) |
| 5 | **Improved variety selection** | | | | |
| | Kharif | 52 (32.50) | 60 (37.50) | 48 (30.00) | 160 (100.00) |
| | Rabi | 40 (25.00) | 76 (47.50) | 44 (27.50) | 160 (100.00) |
| | Summer | 50 (31.25) | 56 (35.00) | 54 (33.75) | 160 (100.00) |
| 6 | **Nursery Management** | | | | |
| | Seed rate: 3kg/ha | 58 (36.25) | 54 (33.75) | 48 (30.00) | 160 (100.00) |
| | Area: for 1 kg onion 5-6 Gunthas | 56 (35.00) | 54 (33.75) | 50 (31.25) | 160 (100.00) |
| | Seed bed: 1b*3l*15h cm | 62 (38.75) | 54 (33.75) | 44 (27.50) | 160 (100.00) |
| | Seedlings: 3-4 lakh/acre | 56 (35.00) | 60 (37.50) | 44 (27.50) | 160 (100.00) |
| 7 | **Spacing** | | | | |
| | Kharif: 15*10 cm | 50 (31.25) | 56 (35.00) | 54 (33.75) | 160 (100.00) |
| | Rabi: 12.5*7.5cm | 60 (37.50) | 52 (32.50) | 48 (30.00) | 160 (100.00) |
| 8 | Organic Fertilizers | | | | |
| | Before sowing FYM/Compost: 40-50 tones | 56 (35.00) | 50 (31.25) | 54 (33.75) | 160 (100.00) |
| 9 | **Chemical Fertilizers** | | | | |
| | **Before sowing** | | | | |
| | N: 50kg | 74 (46.25) | 50 (31.25) | 36 (22.50) | 160 (100.00) |
| | P: 50kg | 52 (32.50) | 62 (38.75) | 46 (28.75) | 160 (100.00) |
| | K: 50kg | 52 (32.50) | 64 (40.00) | 44 (27.50) | 160 (100.00) |
| | **After sowing** | | | | |
| | N: 50kg | 52 (32.50) | 58 (36.25) | 50 (31.25) | 160 (100.00) |
| 10 | Inter cultivation | | | | |
| | Weeding 8-10 days interval | 50 (31.25) | 56 (35.00) | 54 (33.75) | 160 (100.00) |
| | Hoeing after 2-3months | 48 (30.00) | 58 (36.25) | 54 (33.75) | 160 (100.00) |
| 11 | **Irrigation management** | | | | |
| | 8-10 DAS | 50 (31.25) | 62 (38.75) | 48 (30.00) | 160 (100.00) |
| | Rainy: 25 days interval | 56 (35.00) | 58 (36.25) | 46 (28.75) | 160 (100.00) |
| | Winter: 20 days interval | 50 (31.25) | 56 (35.00) | 54 (33.75) | 160 (100.00) |
| | Summer: 15 days interval | 54 (33.75) | 58 (36.25) | 48 (30.00) | 160 (100.00) |
| 12 | **Insect and Pest Management** | | | | |
| | Fruit flies | 52 (32.50) | 60 (37.50) | 48 (30.00) | 160 (100.00) |
| | Purple blotch | 48 (30.00) | 54 (33.75) | 58 (36.25) | 160 (100.00) |
| 13 | **Harvesting** | | | | |
| | after its full growth (4-5 months after planting) | 60 (37.50) | 52 (32.50) | 48 (30.00) | 160 (100.00) |
| 14 | **Production** | | | | |
| | Kharif: 150-200 q/ha | 60 (37.50) | 58 (36.25) | 42(26.25) | 160(100.00) |

| | | | | | |
|---|---|---|---|---|---|
| | Rabi:250-300 q/ha | 58 (36.25) | 62 (38.75) | 40 (25.00) | 160 (100.00) |
| | Summer: 200-250 q/ha | 56 (35.00) | 54 (33.75) | 50 (31.25) | 160 (100.00) |
| 15 | **Storage** | | | | |
| | Onion | 44 (27.50) | 60 (37.50) | 56 (35.00) | 160 (100.00) |
| | Seeds | 46 (28.75) | 58 (36.25) | 56 (35.00) | 160 (100.00) |
| 16 | **Grading** | | | | |
| | Good | 58 (36.25) | 48 (30.00) | 54 (33.75) | 160 (100.00) |
| | Chingli | 60 (37.50) | 52 (32.50) | 48 (30.00) | 160 (100.00) |
| | Jodkanda | 50 (31.25) | 46 (28.75) | 64 (40.00) | 160 (100.00) |
| | Dengle: fuldande | 54 (33.75) | 50 (31.25) | 56 (35.00) | 160 (100.00) |

(Figures in brackets indicate percentage)

It was observed that from table, nearly one half (47.50 per cent) of the onion growers found technological gap in medium type of land followed by 27.50 per cent partial and 25.00 per cent no technological gap. Regarding good type of land 32.50 per cent, 36.25 per cent and 31.25 per cent of the onion growers found complete, medium and no technological gap. Well drained type of land includes 40.00 per cent, 32.50 per cent and 27.50 per cent of the onion growers found complete, partial and no technological gap.

About Land preparation, regarding ploughing 33.75 per cent had complete, 35.00 had partial and 31.25 per cent had no technological gap. 38.75 per cent, 28.75 per cent, 32.50 per cent of complete, partial and no technological gap found in case of harrowing. Regarding FYM 42.50 per cent, 31.25 per cent and 26.25 per cent of the onion growers found complete, partial and no technological gap.

Regarding to sowing 35.00 per cent, 31.25 per cent and 33.75 per cent of the onion growers found technological gap in case of Kharif season. In Rabi season, 41.25 per cent, 35.00 per cent and 23.75 per cent of the onion growers found technological gap in complete, partial and no category. In summer season, 30.00 per cent were in complete, 38.75 per cent in partial and 31.25 per cent in no technological gap.

When it comes to selection of seed, in case of previous year category 36.25 per cent, 33.75 per cent.30.00 per cent found in complete, partial and no technological gap category. From Onion research centre 30.00 per cent, 37.50 per cent and 36.25 per cent found in complete, partial and no technological gap. In case of Agril. University 36.25 per cent, 32.50 per cent and 31.25 per cent of the onion growers found in complete, partial and no technological gap. From KVK 26.25 per cent, 37.50 per cent and 36.25 per cent found complete, partial and no technological gap. About another category 33.75 per cent, 31.25 per cent and 35.00 per cent gap found in complete, partial and no category. 33.75 per cent, 31.25 per cent and 35.00 per cent of the onion growers found in complete, partial and no technological gap in borrowing seeds from other category.

About improved variety selection, 32.50 per cent, 37.50 per cent and 30.00 per cent of the onion growers found complete, partial and no technological gap in selection of kharif season varieties. 25.00 per cent 47.50 per cent and 27.50 per cent technological gap found in complete, partial and never category for rabi season varieties and for summer season 31.25 per cent, 35.00 per cent and 33.75 per cent of the onion growers found gap in complete, partial and never category.

Regarding to nursery management, Seed rate, area, seed bed and seedling preparation, complete technological gap found 36.25 per cent, 35.00 per cent, 38.75 per cent and 35.00 per cent respectively. In partial gap 33.75 per cent, 33.75 per cent 33.75 per cent and 37.50 per cent respectively. In case of never category 30.00 per cent, 31.25 per cent, 27.50 per cent and 27.50 per cent gap found respectively.

About spacing, Kharif and Rabi, 31.25 per cent, 37.50 per cent technological gap found in complete category respectively. 35.00 per cent, 32.50 per cent found in partial category respectively and 33.75 per cent, 30.00 per cent onion growers fell into never category.

Regarding to Organic fertilizers, 35.00 per cent, 31.25 per cent and 33.75 per cent technological gap found in complete, partial and never category.

When it comes to chemical fertilizers, in case of before sowing N, P and K doses, 46.25 per cent, 32.50 per cent and 32.50 per cent technological gap found in complete category respectively. 31.25 per cent, 38.75 per cent and 40.00 per cent fell into partial category respectively. 22.50 per cent, 28.75 per cent and 27.50 per cent were in never technological gap category respectively. After sowing N, 32.50 per cent, 36.25 per cent and 31.25 per cent onion growers fell into complete, partial and never technological gap category.

Regarding inter cultivation which include weeding and hoeing 31.25 per cent, 30.00 per cent had complete technological gap respectively. 35.00 per cent and 36.25 per cent fell into partial category respectively and 33.75 per cent and 33.75 per cent under never category respectively.

About irrigation management, 8-10 DAS, rainy, winter and summer season wise distribution was taken in that 31.25 per cent, 35.00 per cent, 31.25 per cent and 33.75 per cent were under complete technological gap category respectively. 38.75 per cent, 36.25 per cent, 35.00 per cent and 36.25 per cent fell into partial category while 30.00 per cent, 28.75 per cent, 33.75 per cent and 30.00 per cent never technological gap respectively.

Regarding of harvesting, 37.50 per cent, 32.50 per cent and 36.25 per cent technological gap found in complete, partial and never technological gap category.

When it comes to production, kharif, rabi and summer season, 37.50 per cent, 36.25 per cent and 35.00 per cent gap found in complete technological gap category respectively while 36.25 per cent, 38.75 per cent and 33.75 per cent fell into partial category respectively and 26.25 per cent, 25.00 per cent and 31.25 per cent fell into never category respectively.

Regarding to storage of onion and seeds of onion, 27.50 per cent, 28.75 per cent fell into complete technological gap category respectively. 37.50 per cent and 36.25 per cent comes under partial category respectively and equal gap i.e. 35.00 per cent found in no technological gap category respectively.

About grading, four categories were included Good, Chingli, Jodkanda and Dengle, 36.25 per cent, 37.50 per cent, 31.25 per cent and 33.75 per cent fall under complete technological gap category respectively. 30.00 per cent, 32.50 per cent, 28.75 per cent and 31.25 per cent were under partial gap category respectively and 33.75 per cent, 30.00 per cent, 40.00 per cent and 35.00 per cent found in no technological gap category respectively.

**Overall technological Gap in cultivation of Onion Crop**

**Table 2:** Distribution of overall technological gap in Cultivation of Onion crop

| Sl. No. | Category | Respondents (n= 160) | |
|---|---|---|---|
| | | No. | Percentage |
| 1 | Low (up to 39) | 16 | 10.00 |
| 2 | Medium (38 to 50) | 89 | 55.62 |
| 3 | High (51 and above) | 55 | 34.38 |
| | Total | 160 | 100.00 |

**Min:** 28 **Max:** 60

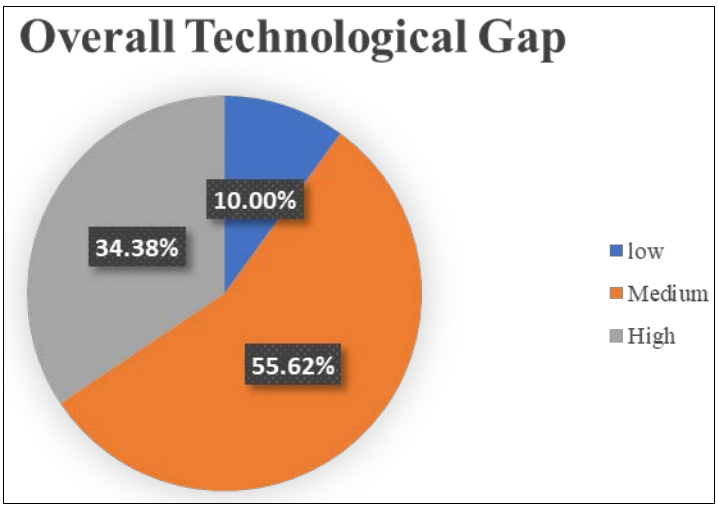


**Fig 1:** Distribution of overall technological gap in Cultivation of Onion crop

According to results shown in Table 2 and figure 1, with regard to suggested onion cultivation practices, the majority of onion growers (55.62 per cent) fell into medium technological gap category, followed by high (34.38 per cent) and low (10.00 per cent) technological gap categories.
The reason behind this may be due to 5.00 per cent of the onion growers are illiterate. The low to medium management orientation and low risk orientation of 38.75 per cent prevented them from implementing better onion cultivation techniques. As a result, 34.38 per cent of onion growers fall into the high technological gap with regard to suggested onion cultivation methods. The majority of onion growers had a medium level of experience and medium level of extension contact also may be the cause behind this technological gap.
The findings are similar with Andhari (2009) [1], Chaudhari (2010) [2], Kumar (2014) [4], Kakade (2021) [3], Patidar (2016) [5].

**Conclusion**

Most of the onion growers fell into the medium level of technological gap in cultivation of onion crop. This technological gap may be due to high cost of fertilizers and their recommended doses, improved storage structure's may be one of the reasons, irregularity in electricity supply, most of time it is difficult to identify diseases and pest, quality of seeds and planting material also may be responsible for the technological gap in cultivation of onion crop.

**Implications**

- Most of the Onion growers faced the problem of improved storage structures for Onion so that they are able to store their onions for longer duration and sell when fair prices in market are available. For reducing physiological losses, unwanted sprouting and rotting, improved Onion storage structures are necessary so it is need to create storage facilities structures through Farmer Producer Organizations (FPO's), etc.
- More focus should be given on timely advisory services to onion growers through concerned Departments, Organisation, State Agricultural Universities, Krishi Vigyan Kendra, Indian Meteorological Department should provide timely and accurately advisory services on social media platforms.
- Dominance of middle man is also one of the major constraints so government should monitor to avoid the mal practices by middlemen**.**

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