



Analysis of Constraints Faced in the Bt Cotton Seed Market in Devbhumi Dwarka District

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study provides an in-depth analysis of the constraints affecting the Bt cotton seed market for farmers and dealers in Devbhumi Dwarka district, Gujarat. Although Bt cotton has revolutionized cotton production by increasing yield and reducing pesticide use, numerous challenges persist in seed acquisition and sales. This research investigates constraints related to seed availability, pricing, demand-supply gaps, and competition. Data were collected through structured interviews with 120 farmers and 20 dealers and analyzed using Garrett's ranking method to prioritize the

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constraints. Results indicate that limited availability of preferred seed brands, high prices, and untimely supply are the primary issues for farmers. Dealers face challenges, including inventory shortages due to demand-supply gaps, high competition, and credit sales pressures. This paper suggests strategies to streamline the seed distribution process and alleviate the constraints faced by stakeholders in the Bt cotton seed market.

Keywords: *Bt cotton; seed market; constraints; farmers; dealers; Devbhumi Dwarka.*

1. INTRODUCTION

Cotton is a vital crop in India, contributing significantly to the economy. The introduction of genetically modified Bt cotton, designed for resistance against bollworms, has reshaped Indian cotton production by reducing reliance on pesticides and improving yields [1,2]. Despite these advancements, stakeholders in the Bt cotton seed market face considerable obstacles. Farmers report challenges in accessing certified seeds due to brand scarcity and high prices, while dealers encounter issues with market competition and supply constraints [3,4].

The study focuses on identifying these barriers in Devbhumi Dwarka district, Gujarat, to formulate effective strategies to enhance market functionality and support stakeholders [5,6]. This paper aims to provide empirical insights into the operational challenges in the Bt cotton seed market, highlighting areas requiring intervention to ensure the efficient distribution and accessibility of Bt cotton seeds.

2. MATERIALS AND METHODS

This study was conducted in the four talukas of Devbhumi Dwarka district—Bhanvad, Khambhalia, Kalyanpur, and Okhamandal—where Bt cotton cultivation is prominent. A multistage sampling method was used to select 120 farmers and 20 dealers actively involved in the Bt cotton seed market, along with five wholesalers or distributors at the district level [7,8]. Farmers were selected based on their engagement in Bt cotton production, ensuring adequate representation across talukas. Data collection involved structured interviews to capture information on the availability, pricing, and market dynamics of Bt cotton seeds.

The interview questions, developed with input from agricultural experts and pilot-tested for clarity, targeted various constraints related to seed purchasing for farmers and market distribution challenges for dealers. Each interview lasted 20-30 minutes and was conducted over three months [9]. Garrett's ranking method was applied to rank the

constraints according to severity, providing an ordered list of challenges based on the respondents' perspectives. This approach facilitated a quantifiable understanding of the primary issues in the Bt cotton seed market and identified key areas requiring intervention.

3. RESULTS AND DISCUSSION

3.1 Constraints Faced by Farmers

The results of study showed that *Bt* cotton growers were faced the major constraints as scarcity of particular brand of *Bt* cotton seeds followed by high price of *Bt* cotton seeds and timely not availability of seeds and gap between demand and supply. Farmers face several critical challenges when purchasing Bt cotton seeds:

- 1. Scarcity of Preferred Seed Brands (Garrett score: 62.21):** [10] Limited availability of specific Bt cotton brands ranks as the top issue, affecting farmers' ability to select seeds best suited for their needs.
- 2. High Prices (Garrett score: 55.01):**[10] The elevated cost of Bt cotton seeds restricts access, particularly for smallholders, impacting the affordability of high-quality seeds.
- 3. Untimely Availability (Garrett score: 54.10):** [10] Delays in seed availability disrupt planting schedules, which can reduce crop yields and affect overall productivity.
- 4. Demand-Supply Gaps (Garrett score: 52.20):** [10] Mismatches between supply and demand create uncertainty in seed access, leading to shortages during critical planting periods.
- 5. Counterfeit Seeds (Garrett score: 41.02):** [10] Farmers face risks from spurious seeds that compromise crop performance and trust in the market.
- 6. Limited Local Accessibility (Garrett score: 35.23):** [10] Seeds are not readily available in nearby markets, adding to logistical challenges and increasing costs for farmers.

Table 1. Constraints faced by farmers during purchasing Bt cotton seed

Sr. No.	Constraints	Garrett's score	Rank
1.	Scarcity of particular brand	62.21	I
2.	High price	55.01	II
3.	Timely unavailability	54.10	III
4.	Gap between demand and supply	52.20	IV
5.	Spurious seed	41.02	V
6.	Seed is not available in nearby area	35.23	VI

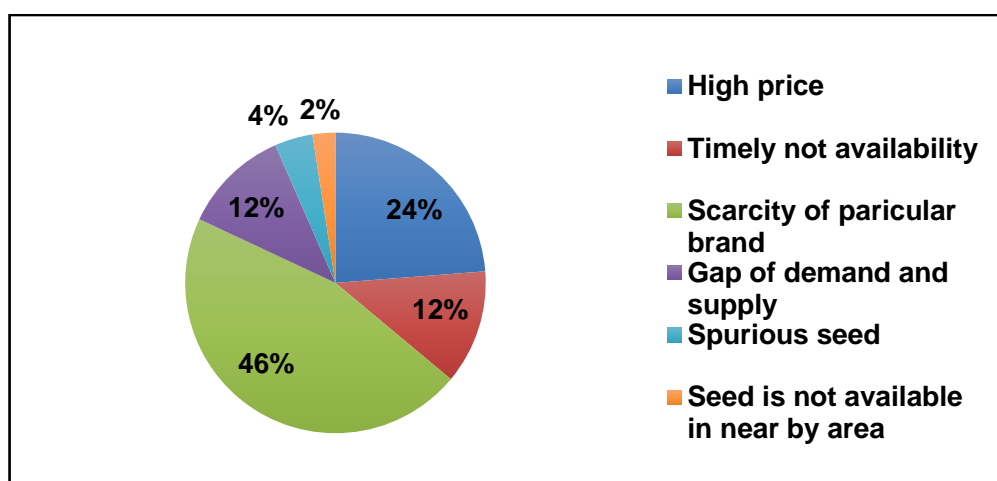


Fig. 1. Constraints faced by farmers during purchasing Bt cotton seed

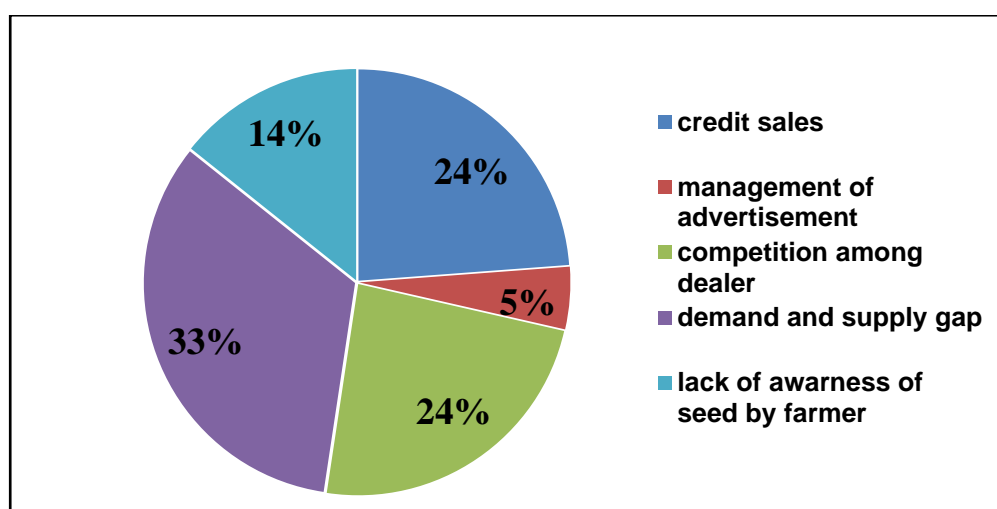


Fig. 2. Constraints faced by dealers in selling of Bt cotton seed

Table 2. Constraints faced by dealers in selling of Bt cotton seeds

Sr. No.	Constraints	Garrett's score	Rank
1.	Gap between demand and supply	57.25	I
2.	Competition among dealer	53.95	II
3.	Credit sales	53.85	III
4.	Management of advertisement	53.25	IV
5.	Lack of awareness of seed by farmer	31.65	V

3.2 Constraints Faced by Dealers

The result of study reveals that dealers were faced constraints of gap between demand and supply of *Bt* cotton seeds. Dealers, who play a crucial role in distributing seeds, also encounter constraints:

1. **Demand-Supply Mismatches (Garrett score: 57.25):** [10] Dealers experience shortages in inventory due to supply-demand imbalances, impacting their ability to meet farmer needs.
2. **High Competition Among Dealers (Garrett score: 53.95):** Intense competition pressures profit margins and poses challenges in customer retention.
3. **Credit Sales Pressures (Garrett score: 53.85):** [10] Offering credit to farmers can create cash flow issues for dealers, limiting their ability to manage inventory effectively.
4. **Advertising and Awareness Management (Garrett score: 53.25):** [10] Limited advertising resources reduce awareness of certified seeds, impacting sales.
5. **Lack of Farmer Awareness (Garrett score: 31.65):**[10] Many farmers are unaware of the benefits of certified seeds, affecting optimal seed selection.

3.3 The Impacts and Suggestions

The study's conclusions draw attention to the market's complex problems with *Bt* cotton seeds. In order to overcome these limitations, the following tactics are suggested:

1. **Improving Seed Distribution and Forecasting:** Demand-supply mismatches can be decreased by strengthening the distribution system and putting strong demand forecasting into place.
2. **Financial Assistance for Farmers:** By offering financial incentives or subsidies for the purchase of premium seeds, farmers may be able to overcome their financial limitations and promote the best possible seed usage.
3. **Promoting Awareness of Certified Seeds:** Government organizations and seed manufacturers ought to work together to increase public knowledge of the advantages of certified seeds and the dangers of fake goods.

4. Regulating Pricing and Competition:

Setting up rules to control dealer competition or set pricing caps could assist maintain market stability and guarantee ethical behaviour.

4. CONCLUSION

The study identifies significant constraints in the *Bt* cotton seed market, affecting both farmers and dealers in Devbhumi Dwarka district. For farmers, the lack of preferred seed brands, high costs, and risks associated with counterfeit products present substantial challenges. Dealers, on the other hand, struggle with inventory management issues, market competition, and financial pressure from credit sales. Addressing these constraints requires coordinated efforts from seed companies, government agencies, and dealers to strengthen supply chains, promote certified seed distribution, and raise awareness of the benefits of certified seeds. Implementing subsidies or financial assistance programs could help alleviate the financial burden on small-scale farmers and encourage a more equitable market structure.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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