

Original Research Article

Open Access

Different Constraints affecting sugarcane production and suggestions for improvement of sugarcane area and production in Telangana state



G. Narendar^{1*}, G. Rakesh², M. Saicharan³, A. Dinesh², A. Krishna Chaitanya⁴ and B. Balaji Naik¹

¹Department of Agronomy, Regional Sugarcane & Rice Research Station, Rudrur, (P.J.T.A.U), Telangana, India

²Department of Genetics and Plant breeding, Regional Sugarcane & Rice Research Station, Rudrur, (P.J.T.A.U), Telangana, India

³Department of Entomology, Regional Sugarcane & Rice Research Station, Rudrur, (P.J.T.A.U), Telangana, India

⁴Department of Soil Science, Regional Sugarcane & Rice Research Station, Rudrur, (P.J.T.A.U), Telangana, India

ABSTRACT

The study was conducted in the sugarcane growing districts namely Nizamabad, Kamareddy, Medak, Wanaparthy and Khammam, where the total (six) sugar factories were located in Telangana. The area under sugarcane cultivation declined from 0.35 lakh hectares in 2017-18 to 0.28 lakh hectares in 2021-22. To find out the problems encountered by the farming community was try to identified during our field visits to various sugar factory regions, farmers were personally interviewed to understand the situation and gather their perspectives. The total 120 number of farmers were selected randomly with 20 number per each factory jurisdiction randomly. The structure schedule was developed keeping in view of the objectives and variables to be studied. The responses were collected personally for data collection. Among the different 6 type of constraints viz. situation constraints, technological constraints, financial constraints, managerial constraints, crop management constraints, infrastructural constraints were identified. 'Shortage of labour for intercultural operations' got 1st rank in the situational constraints. Lack of knowledge about pest and disease control got 1st rank in the technological constraints. High wage rate of labours during for harvesting got 1st rank in financial constraints. Poor turnout by labourer's 1st rank in managerial constraints. Occurrence of heavy weed growth got 1st rank in crop management constraints. Lack of adequate machineries got 1st rank in infrastructural constraints.

Keywords: Sugarcane, survey, situational constraints, financial constraints, technological constraints, suggestions for improvement of sugarcane cultivation

Introduction

The term *sugar* derives etymologically from the Sanskrit *śarkarā* (शर्करा), signifying its ancient cultural and agricultural roots in the Indian subcontinent. Historical records indicate that sugarcane (*Saccharum officinarum* L.) cultivation in India dates to the Vedic period (1400–1000 BCE), establishing it as one of the earliest documented of domestication. Classified as a low-risk, high-reward cash crop, sugarcane remains integral to India's agrarian economy, offering socioeconomic stability to cultivators even under suboptimal agronomic conditions [7]. Approximately 115 countries produce sugar among them Brazil, India, Cuba, Mexico, and Thailand being the leading sugarcane-producing nations. The top 10 countries collectively contribute 80% of global sugar production from sugarcane [4]. Nearly 69% of the world's sugar is consumed within the regions where it is produced. India ranks second globally in sugarcane cultivation, both in terms of area and production, following Brazil. Sugar industry is the second largest agro-based industry next to textile industry. Its future determines the livelihood of millions of farmers. The industry generates sizeable employment directly in the farm sector and indirectly through ancillary related activities [9]. India's sugarcane cultivation during 2023-24 reached to the area of 5.74 million hectares, yielding 453.16

million tonnes with an average productivity of 78.95 tonnes per hectare [2].

In India, sugarcane cultivation accounts for 2.60% of the gross cropped area. The cultivated area has steadily increased from 2.7 million hectares in 1980-81 to 5.74 million hectares in 2023-24. Sugarcane cultivation in India thrives under diverse climatic conditions, encompassing both tropical and subtropical zones. Over the past decades, India has experienced consistent growth in sugarcane cultivation, characterized by increases in area, production, productivity, and sugar recovery. India produces approximately 34.0 million metric tonnes of sugar which is 18% of total global sugar during the year 2023-24 [4]. The crop is predominantly grown in Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Gujarat, Punjab, Haryana, Uttarakhand, and Bihar. Together, Uttar Pradesh and Maharashtra account for nearly 68.70% of the total sugarcane area and contribute approximately 69.70% of India's total sugarcane production. In the state of Telangana, the area is decreasing from 0.35 lakh hectares (2017-18) to 0.27 lakh ha (2023-24) despite of favourable growing conditions prevailing in the state [2].

Materials and Methods

The study was taken up in the state of Telangana, India during 2023-2024 with a sample size of 120 respondents. The basic objective is to study the different constraints faced by the sugarcane growers in the state is, the area of the sugarcane crop is 0.35 lakh tonnes during 2017-18 and the area decreased to 0.28 lakh tonnes in the year 2021-22 (2). During our field visits we met the different farmers in all the sugar factory vicinities in

*Corresponding Author: G. Narendar

DOI: <https://doi.org/10.21276/AATCCReview.2025.13.02.485>

© 2025 by the authors. The license of AATCC Review. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

personal, based on the farmers feedback prepared a script for the survey. The state of Telangana consists of six number of sugarcane mills in which the entire sugarcane is processed viz. Madhucon Sugar and Power Industries Limited; Ganapati Sugar Industries Limited; Trident Sugars Limited; Gayatri Sugars Limited., (Maagi); NSL Krishnaveni Sugars Limited; Wanaparthi, Gayatri Sugars Limited (Adloor)

Based on the survey conducted from 120 sugarcane farmers across the state, it is known that the farmers are facing different problems based on the problem we have categorised those constraints into different parts. They are situational constraints, technological constraints, financial constraints, managerial constraints, crop-management constraints, infrastructural constraints, physiological constraints, communication constraints, infrastructural constraints. For each category problems were listed out and given ranking based on their opinion.

A pre-tested structured schedule was used to collect relevant data from respondents. The information gathered included general details, landholding size, intercropping practices, inputs used, cultivation costs, and perceptions of various production and marketing challenges faced by sugarcane growers. Interviews were conducted at respondents' homes or, in some cases, at a common village location. The study's purpose was clearly explained to the participants. To assess the constraints in sugarcane production and marketing, Garrett's ranking technique was employed.

Garrett's Ranking Technique

Garrett's Ranking Technique is a sophisticated analytical tool employed for evaluating variables through mean scores derived from rank orders. It enables the transformation of ordinal constraints and benefits into quantitative metrics. Unlike conventional frequency distributions, this method offers a nuanced assessment by structuring constraints according to their relative intensity as perceived by respondents. Consequently, identical sample sizes may yield divergent rankings for multiple constraints, reflecting variations in their perceived severity.

Garrett's formula for converting ranks into percentage is

$$\text{Percentage position} = 100 * (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} = Rank given for i^{th} constraint by j^{th} individual

N_j = number of constraints ranked by j^{th} individual

The percentage position of each rank will be converted into scores referring to the table given by Garret and Wood worth (1969).

The scores of individual respondents will be added together for each factor and divided by total number of respondents for whom scores will be added. The mean scores for all constraints will be organized in descending order, with rankings assigned based on their respective values.

Results and Discussion

Situational constraints

These constraints include factors that have impeded the production of sugarcane in the fields. The various problems experienced by the growers in the area are shown in Table 1. In the situational constraints category the major constraint expressed by the farmer is "shortage of labour for intercultural operations" with a mean score of 65.69 percent, as the crop requires high labour during the crop growth period. The next big problem in this category is "Non availability of inputs in

time" with a mean score of 64.58 percent, as the crop area under this crop decreasing the dealers are not much interested in selling of the required special inputs needed for this crop solely because of the different problems at the dealer-end. The next constraint under this is "Unavailability of machinery at village level with a mean score of 61.05 percent. This is also because the area under this crop is decreasing the shops are not showing specific interest [11].

Technological constraints

These constraints include factors that have impeded the production of sugarcane in the fields. The various problems experienced by the growers in the area are shown in Table 2. Under the technological constraints the major problem is "Lack of knowledge about pest and disease control" with a mean score of 63.05 and Garrett score I and second constraint is "Unavailability of high yielding varieties" with a mean score of 62.05 percent [7].

Financial constraints

Financial constraints include factors that have impeded the production of sugarcane in the fields. The various problems experienced by the growers in the area are shown in Table 3. Among the different financial constraints "High wage rate of labourers during for harvesting" with a mean score of 63.66 and occupied Rank I of Garrett score. The second rank with a mean score of 61.10 came to "High cost of herbicides, fertilizers and other inputs." The third rank with a mean score of 59.61 was came to "Low price by government" [3] [1] [11]

Managerial constraints

The managerial constraints that have impeded the production in sugarcane were shown in table 4. The table summarizes managerial constraints based on their mean scores and Garrett's ranking. The top-ranked constraint is "Poor turnout by labourers" (55.4), followed closely by "non-availability of labourers" (54.9). "Delayed cutting orders" ranks third (47.6), while "non-cooperation of neighbouring farmers in irrigation, drainage, and pesticide application" is the fourth constraint (44.1). These constraints highlight workforce issues and coordination challenges as key managerial concerns [5].

Crop management constraints

The crop management constraints that have impeded the production in sugarcane were shown in table 5. The table outlines key crop management constraints ranked by their severity. The most significant issue is the "Occurrence of heavy weed growth" (64.1), followed by "Pest and disease problems" (56.3). "Drought problem" ranks third (49.3), while "Crop lodging" (42.5) and "Saline and alkaline problem soils" (39.8) are ranked fourth and fifth, respectively. These constraints indicate that weed infestations, pest attacks, and water-related challenges are the primary concerns in crop management [5] [11].

Infrastructural constraints

The infrastructural constraints that have impeded the production in sugarcane were shown in table 6. The table highlights key infrastructural constraints in agricultural management. The most critical issue is the "Lack of adequate machineries" (56.02), followed by the "Lack of transport facilities for transfer of inputs/harvested produce" (53.68). "Unavailability of drought-tolerant varieties" ranks third (51.35).

Other significant constraints include "Poor maintenance of roads" (49.17), "Lack of road facilities" (47.81), and "Poor maintenance of irrigation channels" (43.38). These challenges indicate that inadequate machinery, transportation issues, and poor infrastructure maintenance are major obstacles to efficient agricultural operations.

With this survey farmers have given some suggestions for sugarcane cultivation in Telangana.

Suggestions of the farmers for improvement of sugarcane area in Telangana

To enhance agricultural productivity and address existing constraints, key measures should be implemented. Timely supply of subsidized production inputs, such as seeds, fertilizers, and pesticides, is essential to reduce costs and improve yields. Ensuring labour availability during critical farming periods with fair wages can help mitigate workforce shortages. Establishing village information centres will provide farmers with real-time guidance on weather, pest management, modern techniques, and government schemes. Increasing the Fair and Remunerative Price (FRP) for sugarcane will ensure better profitability and financial stability for farmers. Additionally, promoting the use of modern machinery and equipment, such as automated planters, harvesters, and improved irrigation systems, can enhance efficiency and reduce labour dependency. Providing financial assistance or subsidies for these tools will encourage farmers to adopt advanced technologies. These strategic interventions will significantly improve farm management, increase sugarcane production, and ensure the sustainability of agricultural practices.

Conclusion

Sugarcane production faces multiple challenges across situational, technological, financial, managerial, crop management, and infrastructural aspects. Labor shortages, untimely input availability, and lack of machinery hinder field operations, while inadequate knowledge of pest control and the unavailability of high-yielding varieties further impact productivity. High labour wages and expensive inputs strain farmers financially, whereas poor labour turnout and lack of coordination among farmers create managerial inefficiencies. Crop management is affected by heavy weed growth, pest infestations, drought, and soil issues. Additionally, infrastructural deficiencies such as inadequate machinery, poor transport, and deteriorating irrigation channels limit efficiency. Addressing these constraints requires a multi-faceted approach, including policy interventions, improved labour management, advanced farming techniques, financial support, and infrastructural development. By implementing these measures, sugarcane productivity can be enhanced, ensuring sustainable farming practices and better economic returns for farmers.

Future scope of study

The future scope of this study lies in the development of targeted interventions to address the constraints identified in sugarcane cultivation in Telangana. Research could focus on enhancing labor efficiency through mechanization, introducing high-yielding and drought-tolerant varieties, and improving pest and disease management practices. Further studies may explore innovative input supply chains and the development of village-level infrastructure to ensure the timely availability of resources. Assessing the effectiveness of farmer information centres and digital advisory platforms could strengthen knowledge dissemination.

Additionally, evaluating policy measures, such as price support mechanisms and input subsidies, may facilitate sustainable sugarcane production, ultimately improving farmers' incomes and fostering regional agricultural growth.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgement

The authors acknowledge Professor Jayashankar Telangana Agricultural University (formerly PJTSAU), Hyderabad, Telangana for providing financial assistance and facilities during the above study.

Table.1. Situational constraints faced by the farmers

S. No.	Situational constraints	Mean Score	Garret Rank
1	Shortage of labour for intercultural operations	65.59	I
2	Non-availability of inputs in time	64.58	II
3	Non-availability of machinery at the village level	61.05	III
4	Shortage of fertilizer and other inputs in the market	59.43	IV
5	Unavailability of plant protection appliances.	57.36	V
6	Non availability of good quality manure	53.90	VI
7	Non available contact office near to the village.	52.67	VII
8	Transportation problem of sugarcane setts	52.53	VIII
9	Heavy winds in Oct/Nov lodges sugarcane	46.83	IX
10	Heavy risk due to failure of monsoon rains	44.88	X
11	Biased treatment from factory officers for harvesting and crushing	44.28	XI
12	Inadequacy of irrigation water at proper time	42.78	XII
13	Irregular supply of electricity.	37.40	XIII
14	Regional politics	35.25	XIV

Table.2: Technological constraints faced by the farmers:

S.No.	Technological constraints/Technical	Mean Score	Garret Rank
1	Lack of knowledge about pest and disease control	63.05	I
2	Unavailability of high yielding varieties	62.05	II
3	Lack of technical guidance	58.63	III
4	Lack of knowledge about exact dose and timing of application of fertilisers	56.53	IV
5	Lack of training at the village level	55.75	V
6	Lack of exposure to mass media and information etc.	47.21	VI
7	Lack of trainings for modern agricultural technologies	45.07	VII
8	Lack of the knowledge about sugarcane production technology	43.70	VIII
09.	Lack of knowledge about use of water and its critical stages of application.	38.29	IX
10.	Non availability of sugarcane sets in time	34.73	X

Table.3: Details of Financial constraints faced by the farmers

III.	Financial constraints	Mean Score	Garret Rank
01.	High wage rate of labours during for harvesting.	63.66	I
02.	High cost of Herbicides, pesticides, and other inputs	61.10	II
03.	Low price by government.	59.61	III
04.	Payment by factory through instalments so it is not Profitable.	55.40	IV
05.	Lack of finance to purchase sets, fertilizers and other inputs	53.78	V
06.	High rate of interest for credit	50.03	VI
07.	Tedious procedure for getting loan	49.08	VII
08.	Lack of alternative employment during lean period of agriculture	43.76	VIII
09.	Low price given by factory	43.69	IX
10.	High cost of sugarcane sets at sugarcane seed set plot	43.21	X
11.	High cost of cultivation	37.59	XI

Table 4: Different managerial constraints faced by the farmers

IV.	MANAGERIAL CONSTRAINTS	Mean Score	Garret Rank
1.	Poor turnout by labourers	55.40	I
2.	Non availability of labourers	54.90	II
3.	Delayed cutting orders	47.60	III
4.	Non-cooperation of neighbouring farmers in irrigation, drainage and application of pesticides	44.10	IV

Table 5: important crop management constraints faced by the farmers

V.	CROP MANAGEMENT CONSTRAINTS	Mean Score	Garret Rank
1.	Occurrence of heavy weed growth	64.10	I
2.	Pest and disease problem	56.30	II
3.	Drought problem	49.30	III
4.	Crop lodging	42.50	IV
5.	Saline and alkaline problem soils	39.80	V

Table 6: Different infrastructural constraints faced by the farmers

VI.	INFRASTRUCTURAL CONSTRAINTS	Mean Score	Garret Rank
1.	Lack of adequate machineries	56.02	I
2.	Lack of transport facilities for transfer of inputs/ harvested produce	53.68	II
3.	Unavailability of drought tolerant varieties	51.35	III
4.	Poor maintenance of roads	49.17	IV
5.	Lack of road facilities	47.81	V
6.	Poor maintenance of irrigation channels	43.38	VI

References

- Alimul I. and Bose D.K. (2022) Challenges to Adoption of Sugarcane Production Technology in Balrampur District of Uttar Pradesh, India. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 14, Issue 9, pp.- 11639-11642.
- Anonymus 2024: Directorate of Sugarcane Development, Department of Agriculture & Farmers welfare, Ministry of Agriculture and Farmers welfare, GOI
- Anonymus 2020: Final report of task force of the sugarcane and sugar industry. Status paper on sugarcane. Niti Aayog, GOI.
- Anonymus 2024. USDA Foreign Agricultural Services, data on sugarcane production <https://www.fas.usda.gov/data/prolduction/commodity/061200>
- Hafiz ali Raza, R.M. Amir, Aqeela Saghir, Muhammad Tahir (2020). Sugarcane production and protection constraints faced by the growers of Punjab, Pakistan with special focus on the role of agricultural extension worker in related mitigation. Pakistan Journal of Agricultural Sciences. 57(6): 1681-1688.
- Mahendra Kumar Deshmukh, AK Gauraha and MR Chandrakar (2021). Constraints in the cultivation and marketing of sugarcane production in Kabirdham district of Chhattisgarh, India. The Pharma Innovation Journal. 2021; 10(6s): 449-451.
- Mohit Kumar, H.C. Singh and Arun Kumar Rajbhar (2020). Study on constraints faced by the sugarcane growers in Western Uttar Pradesh, *Plant Archives* Vol. 20 pp. 1885-1888.
- Siddu Hanabar, Y. N. Havaladar, K. V. Ashalatha, N. L. Pavithra and Anand (2021). Constraints in the Cultivation and Marketing of Sugarcane in the District of Belagavi, Karnataka. International Journal of Current Microbiology and applied Science 10 (02): 2060-2064
- Shiva pujan Singh, Meera kumari, Md. Minnatullah, D.N. Kamat and Bipin kumar (2014). Trends in growth rates in Area, production and productivity of sugarcane in Bihar. International journal of current microbiology and Applied sciences. 3 (4): 1167-1175.
- Thangavelu S and Subhadra (2005). "Sugarcane technology in the last eight decades in india in sugarcane production. Co-operative sugar 36 (9).
- ZimiThibane, Siphelele Soni, Lerato Phali, LelethuMdoda (2023). Factors impacting sugarcane production by small-scale farmers in KwaZulu-Natal Province-South Africa. *Heliyon* 9 (2023) e13061.