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ENHANCING SUGARCANE PRODUCTIVITY IN KARNATAKA, CATALYSING AGRICULTURE GROWTH

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ABSTRACT

Sugarcane cultivation plays an important role in the agricultural and allied activities for rural industry of Karnataka, India. sugarcane productivity occupies a very important position in sugarcane cultivation This study focuses on the factor influencing sugarcane productivity among sugarcane farmers in the Karnataka. Which is known for its favourable climatic condition and suitable soil for sugarcane cultivation. By examining the land soil characteristics, climate and weather condition, farm management practices, access to resources and inputs farmer knowledge and awareness, and market dynamics, this case study aims to identify the key factors affecting sugarcane productivity in Karnataka. The study utilizes qualitative and quantitative data and literature reviews, to gain insights into the challenges faced by small-scale farmers. The findings highlight the importance of soil quality, appropriate irrigation techniques pest and training and market linkages for improving sugarcane productivity. The study also emphasizes the need for policy intervention and support systems to address these factors and enhance the livelihoods of sugarcane farmers in Karnataka. Ultimately, this research contributes to a better understanding of the complexities surrounding sugarcane in small scale farming system, providing a foundation for sustainable agricultural practices and rural development in the region.

Key Words: Sugarcane Productivity, Income of farmers, Economic livelihood, sustainable agriculture.

INTRODUCTION

The sugarcane industry plays a pivotal role in Karnataka's agricultural landscape contributing importantly to the state's economy according to 2023-24 Karnataka economic survey report sugarcane accounts 9% of the total agriculture crop area in Karnataka. As we delve into the intricacies of sugarcane productivity, this research paper aims to unravel the multifaceted factors that influence its cultivation and yields across various regions in Karnataka. Through a comprehensive analysis, we will explore the impact of climate, soil quality, irrigation techniques, agricultural practices, sugarcane varieties, technology adoption and government policies on productivity. By examining these factors, we seek to provide valuable insights that can inform sustainable strategies for enhancing sugarcane productivity in Karnataka, addressing the continued growth of this vital agricultural sector.

The productivity of sugarcane plays an impotent role in the economic well-being of sugarcane farmers in Karnataka. sugarcane cultivation contributes significantly to the agricultural sector and acts as a major source of income for farmers in the region. however,

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several factors can impact the productivity of sugarcane crops, thereby affecting the livelihoods of these farmers

This case study aims to explore the various factors that influence sugarcane productivity among sugarcane farmers in the Karnataka. By understanding these factors, policymakers, researchers, and farmers cane develop effective strategies to enhance productivity and improve the overall agricultural.

Tabel 1: Some major State wise Area (Lakh ha), Production (Million Tonne), and Productivity (Tonnes/ha) of Sugarcane in the country 2020-21

SL no	States/UT	Area	Production (million tonnes)	Productivity
1	Uttar Pradesh	21.08	177.67	81.50
2	Maharashtra	11.43	101.60	88.90
3	**Karnataka**	**4.43**	**42.09**	**95.00**
4	Bihar	2.19	10.71	48.92
5	Gujarat	2.15	15.85	73.69
6	Tamil Nadu	1.25	12.80	102.73
7	Madhya Pradesh	1.10	5.88	53.45
8	Haryana	0.99	8.53	86.18
9	Punjab	0.88	7.49	83.82
10	Uttarakhand	0.84	6.96	82.90
11	All India	48.57	399.26	82.20

Sources: Statistics APY

LITERATURE REVIEW

The literature on sugarcane productivity highlights various factors influencing its growth, yield, and overall performance, studies often delve into the impact of agronomic practices, climate condition, soil health, and technological advancements Researchers explore how these factors individually and collectively affect sugarcane crops, aiming to enhance productivity, disease resistance, and sustainability. Through an extensive literature review, a comprehensive understanding of the complex dynamics influencing sugarcane productivity emerges.

L.K.G. Naidu (2002) Characterisation of sugarcane soil of Karnataka. In this Research Paper focused different types soils. And its uses in cultivation of sugarcane. *Ashok k Srivastava and Mahendra K Rai (2012*) Sugarcane Production: Impact of Climate Change and its mitigation. The Karnataka Sugarcane (Regulation of Purchase and Supply) Act 2013 Government of Karnataka. Status Paper on Sugarcane Directorate of Sugarcane Development Government of India 2013. Constraints in the Cultivation and Marketing of Sugarcane in the District of Belagavi, Karnataka, India. Siddu Hanbar, Y N Havaldar, K V Ashalatha, N L Pavitra Anand. (10Number 02,2021). A Glance on sustainable Sugarcane Farming in India. M. Jayanthi, Dr.M. Suguna Publication (31/01/2022 ISSN: 2455-0620)

METHODOLOGY

This research paper a comprehensive review of secondary data, including academic articles, reports, and case studies to analyse the importance of productivity In sugarcane farming and its helps to the improving farmers economic status. The methodology involves a systematic examination of existing literature to identify challenges of improving productivity of sugarcane in Karnataka.

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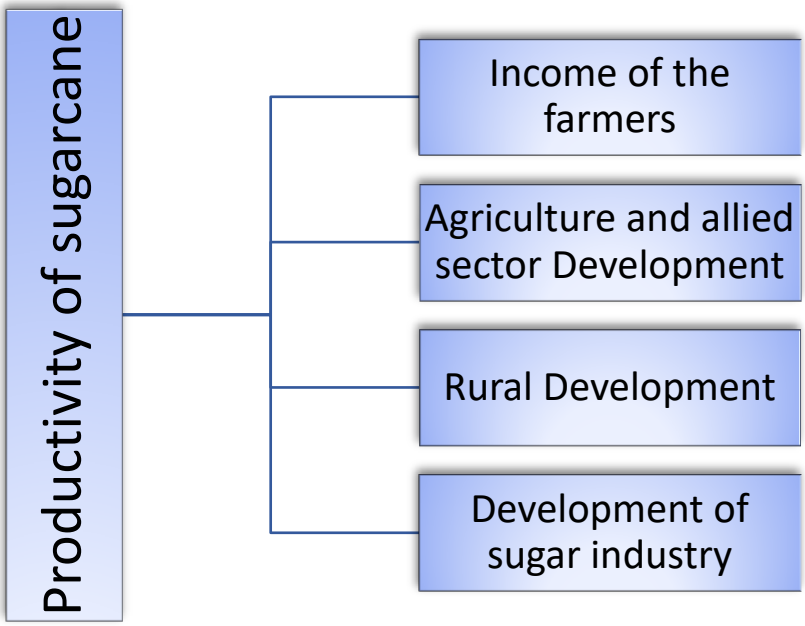
OBJECTIVES

1. To assess the current status of sugarcane productivity in Karnataka.
2. To identify key constraints affecting sugarcane productivity.
3. To evaluate the role of improved technologies and practices.

Understanding the relation between Productivity of sugarcane and its contribution



The income of sugarcane farmers mainly depends on the yield of that crop. Production of the crop depends on productivity of sugarcane productivity it means per hectare yield, when productivity increase same time income of the farmer will be increase its helps to improving economic livelihood of farmers, Agriculture development and Rural development and sugar industry development According to 2020-21 data Karnataka state 2nd place in sugarcane productivity after Tamil Nadu. However, due to several factors' sugarcane productivity is constantly changing with unpredictable changes, so that farmers' incomes are becoming unpredictable.

Sugarcane Productivity in Karnataka

Karnataka state sugarcane cultivation Area, Production and Productivity during 2015-16 to 2021-22

Year	[lakh Area ha]	Production [million tonnes]	Productivity [tonnes/ha]
2015-16	4.50	37.83	84.08
2016-17	3.97	27.38	68.96
2017-18	3.70	31.14	84.08
2018-19	4.71	42.41	90.00
2019-20	4.29	38.18	89.00
2020-21	4.43	42.09	95.00
2021-22	5.88	56.45	96.00
AVG	4.22	36.24	85.41

Source: (sugarcane.dac.gov.in)

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Factors affect Sugarcane Productivity

Climate condition

In Karnataka Sugarcane is a tropical as well as a subtropical crop it grows well in hot and humid climate with temperature of 21`C to 27` C and an annual rainfall between 75cm

The impact of temperature, rainfall, and humidity on sugarcane productivity climate variables have significant contribution to increase or decrease sugarcane yield the impact of average rainfall, average maximum and minimum temperature during monsoon, summer, autumn and winter seasons on sugarcane yield in Karnataka.

Rainfall

Sugarcane requires an adequate and well-distributed water supply throughout its growing season insufficient rainfall or drought conditions can limit sugarcane yields and stunted growth. Conversely, excessive rainfall or waterlogging can cause root rot other diseases.

According to THE HINDU News sept 30, Karnataka under spell of drought as all 31 districts receive poor rain. The south west monsoon season for 2023 officially ended on September 30 and deficiency being 25% in the state. This deficiency effect on sugarcane farming in Karnataka to see 20% reduction in sugarcane crop due to less monsoon.

Soil quality

Sugarcane prefers well-drained, fertile soils with good water-holding capacity the soil should be rich in organic matter and have a pH range of 5.5 to 8.0 poor soil fertility, nutrient deficiencies, or soil salinity can limit sugarcane growth and productivity. Sugarcane can be grown an all types of soil ranging from sandy loam to clay loam. It However, thrives best on well drained soils.it can also be raised successfully on lighter soils provided there is adequate irrigation facilities and on heavy clays with proper drainage and addition organic matter.

Irrigation

In irrigation with insufficient rainfall, irrigation plays a important role in sugarcane production. Appropriate irrigation scheduling and technique, such as drip irrigation or furrow

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irrigation, help ensure that sugarcane plants receive sufficient water during critical growth stages. *2030 Water Resources Group published 24/5/2017* In Karnataka looks at drip irrigation for sugarcane farming. Its main objective low water intensive agricultural practices in the backdrop of unreliable monsoon seasons.

Fertilization

Sugarcane is a nutrient-demanding crop, requiring adequate amounts of nitrogen, phosphorus, potassium, and other essential elements. Proper fertilization practices, based on soil nutrient analysis and crop requirements, are crucial to optimize sugarcane growth and yield.

Cultivar selection

Choosing the right sugarcane varieties or cultivars is crucial for maximizing yields. Different cultivars have varying levels of disease resistance, productivity, and adaptability to specific climates and soil conditions. In Karnataka 4 Region used different varieties 1. Southern Costal and North Karnataka (Co8371,86032) 2. Central Karnataka (Co7804 Co62175) 3.Central and North Karnataka (Coc671 Co 86032 Co92020) 4.North Karnataka (CoC 671 Co 86032 Co 94012 SNK754 SNK61 SNK44).

Pest and disease management

Sugarcane is susceptible to various pests and diseases, such as sugarcane borers, aphids, grasshoppers, and fungal infections like smut and rust, effective pest and disease control measures including regular monitoring, proper sanitation and the use of resistant cultivars or appropriate pesticides, are essential for protecting sugarcane crops.

Harvesting and post-harvest practices

Timely and proper harvesting techniques, including the use of appropriate machinery can minimize losses and maximise the recovery of sucrose from sugarcane stalks. Post-harvest practices, such as cleaning, transportation, and storage, also impact the quality and shelf life of sugarcane products.

Research Innovation

Research and innovation play important role in sugarcane cultivation Promote research and innovation in sugarcane cultivation, focusing on developing new technologies and methodologies to boost productivity and resilience.

Policy Advocacy

Advocate for policies that support sugarcane farmers, addressing challenges and providing incentives for sustainable practices to enhance overall productivity. The state government has constituted sugarcane control bord as provide for under section 3 of Karnataka sugarcane Act 2013 Government conduct duties and programmes under this Act. And central government also conduct policies for Example price policy 22 Feb 2024 recently increased price at 340 rupees per quintal for the year 2024-25 compared to previous year which was 340 rupees. Sugarcane FRP hike 25 rupees.

Sugarcane Productivity in Karnataka Govt FRP (Per Tonne)

Many factors influence sugarcane productivity in Karnataka and its productivity is continually changing. According to the figure for the year 2015-16 to 2021-22 the productivity constantly changing along with increasing government FRP of sugarcane, and its increasing at very low rate. And below calculated total revenue according to figures,

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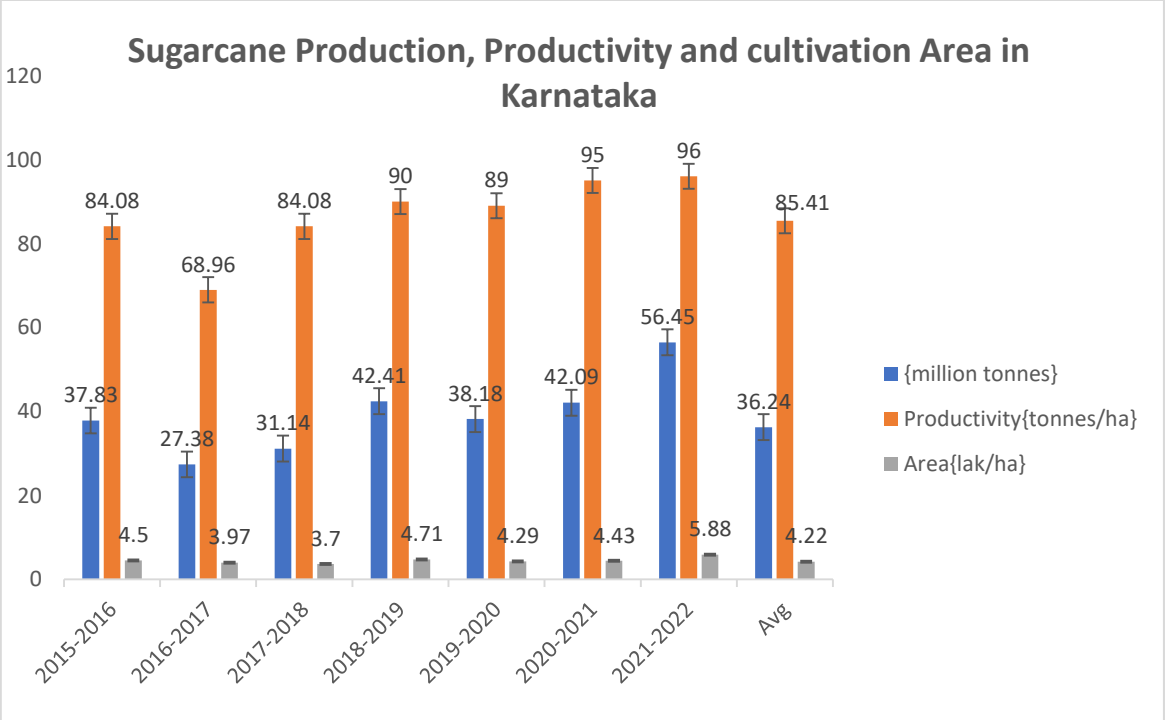
productivity (tonnes/ha) and government FRP and total revenue includes total production cost of sugarcane.

Karnataka state sugarcane cultivation Area, Production and Productivity during 2015-16 to 2021-22

Year	[lakh Area ha]	Production [million tonnes]	Productivity [tonnes/ha]	Govt FRP {fair and Remunerative price} [Per Tonne}	Total Revenue {Per/ha}
2015-16	4.50	37.83	84.08	2550	214404
2016-17	3.97	27.38	68.96	2550	175848
2017-18	3.70	31.14	84.08	2750	231220
2018-19	4.71	42.41	90.00	2850	256500
2019-20	4.29	38.18	89.00	2850	253650
2020-21	4.43	42.09	95.00	2900	275500
2021-22	5.88	56.45	96.00	3050	292800
AVG	4.22	36.24	85.41	2780.57	237926



Source: [sugarcane.dac.gov.in]

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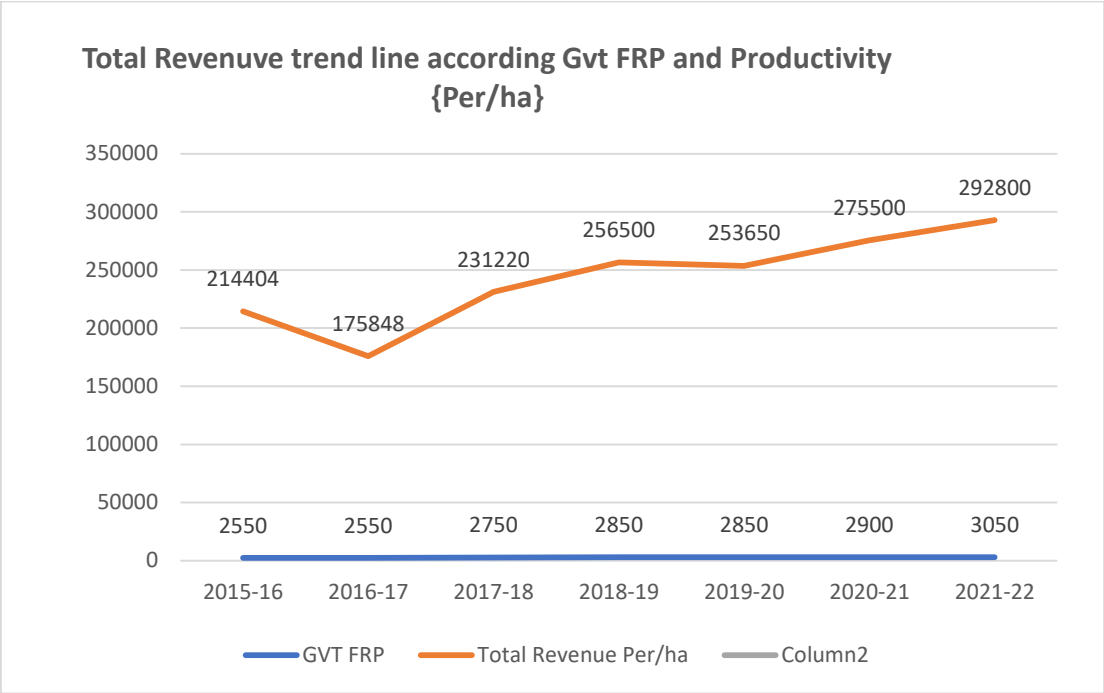
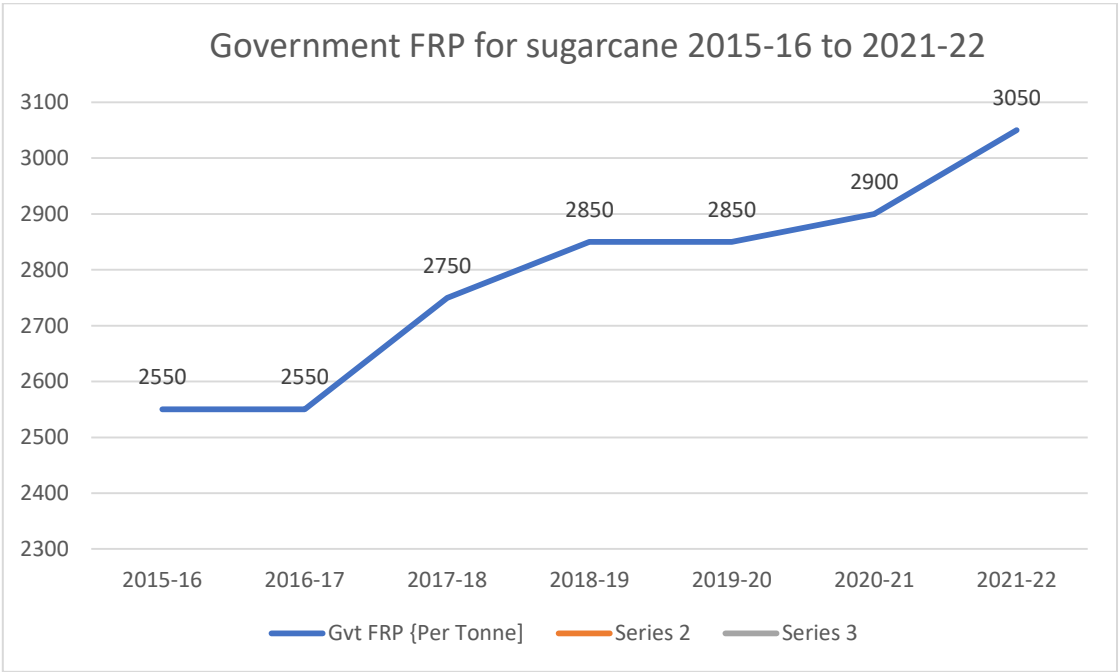
Below chart line shows farmers revenue According to Government FRP and Productivity (per /ha)



Below chart line shows Govt fair and Remunerative price {per tonne} 2015-16 to 2021-22



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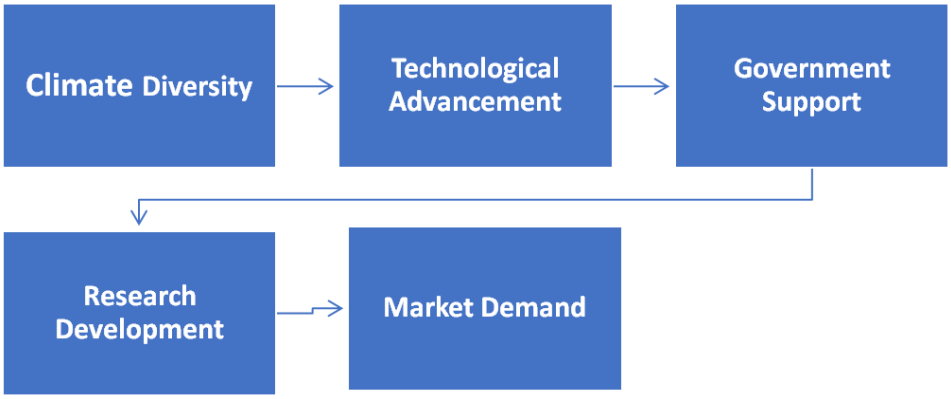
OPPORTUNITIES AND CHALLENGES

Opportunities



Karnataka's diverse climatic condition present opportunities for cultivating a wide range of sugarcane verities suitable for different agro-ecological zones, maximizing productivity throughout the state. Rapid advancement in agricultural technologies offer opportunities for precision farming mechanisation, and the adoption of innovative practices to enhance sugarcane productivity and sustainability. And government policies, subsidies, support programs aimed at promoting sugarcane cultivation, improving irrigation infrastructure, and providing access to credit and market linkages can create favourable conditions for farmers to increase productivity. Investment in research and development initiatives focused on breeding high-yielding, disease-resistant sugarcane varieties, improving crop management practises and developing sustainable farming technologies can unlock the potential for higher productivity in Karnataka. Growing demand for sugar and related products in domestic and international markets presents opportunities for sugarcane farmers in Karnataka to increase production and profitability through efficient supply chain management and value addition.

Challenges

Limited availability of water resources and increasing competition from other sectors pose challenges for sugarcane cultivation, necessitating efficient water management practices and the adoption of drought-tolerant varieties. Persistent threats from pests and diseases, such as

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the sugarcane aphid and red rot, can significantly reduce yields and require continuous monitoring, early detection, and integrated pest management strategies to mitigate risks. Soil erosion, nutrient depletion, and degradation due to intensive cultivation practices and inadequate soil conservation practices and inadequate soil conservation measures pose challenges for maintaining soil fertility and sustainability in sugarcane-growing areas of Karnataka. Declining availability of skilled labour for manual tasks such as planting, weeding, and harvesting presents challenges for sugarcane farmers, necessitating mechanization and labour-saving technologies to optimize productivity and reduce dependence on manual labour. Fluctuations in sugar prices, influenced by factors such as global market trends, government policies, and input costs, pose challenges for sugarcane formers in Karnataka. Environmental concerns related to sugarcane cultivation including deforestation, habitat loss, water pollution from agrochemical runoff, and greenhouse gas emissions, necessitate sustainable farming practices and regulatory compliance to negative impacts.

Addressing these challenges while leveraging opportunities can help sugarcane farmers in Karnataka improve productivity, profitability, and sustainability in the long term.

CONCLUSION

Several factors influence sugarcane productivity, including climate conditions, soil quality, water availability, and agricultural practices. Successful cultivation requires optimal temperature, adequate rainfall, or irrigation, along with well-drained and fertile soils. Additionally, the use of modern farming techniques and appropriate fertilization plays a important role in enhancing sugarcane yields. A holistic approach considering these factors is essential for sustainable and high -yielding sugarcane production. Balancing these elements through sustainable farming methods and technological advancements is crucial for optimizing sugarcane yields and ensuring a stable sugar production industry.

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