Journal of AgriSearch, 13 (3) : 155-166
An Open Access International Peer Reviewed Quaterly

ISSN : 2348-8808 (Print), 2348-8867 (Online)
https://doi.org/10.21921/jas.v13i03.15289

Sugarcane Cultivation in Bihar: Current Status, Constraints, Management Strategies, Future Research Opportunities and Policy Perspectives

Ashutosh Kumar Mall[1*], Anil Kumar Singh[2], Varucha Misra[1], Manoj Kumar Tripathi[1], Rahul Kumar Tiwari[1] and Rajeev Kumar[1]

ABSTRACT

The cultivation of sugarcane is highly prevalent in the state of Bihar as a commercial crop, and it serves a very important purpose to support the economic sustenance of farmers and the local sugar industry. However, several biotic and abiotic problems hinder its yield, cane quality, and the recovery of sugar from its juice. This article highlights the present status of sugarcane crop in Bihar, constraints related to its production, management options, and future research directions. Water logging during monsoon season, imbalance of fertilizer use, lack of irrigation during pre-monsoon seasons, poor use of advanced technologies in growing it, and growing it in low-quality soil are some constraints faced by the growers. Apart from this, the incidence of pests, diseases and insects, poses a significant threat to the yield and quality of cane. Late harvesting, harvesting old/stale canes, and cane lodging are other limiting factors that reduce the yield of sugarcane. The importance of adopting advanced crop management techniques, which include proper utilization of nutrients and water, inter-cropping, crop protection, earthing up, and propping, has also been emphasized in this article. It is important to improve farmers' training alongside coordinating with stakeholders for the effective adoption of technology. The development of drought and waterlogging resistant sugarcane varieties for this region is an important area of future research. In addition, the application of advanced technologies should be promoted to enhance sustainable sugarcane farming in this state.

Keywords: Sugarcane, Bihar, Waterlogging, Climate-resilient agriculture, Sustainable sugarcane production

ARTICLE INFO

Received on	:	17/06/2026
Accepted on	:	18/08/2026
Published online	:	30/09/2026

CC BY SA

INTRODUCTION

Sugarcane cultivation holds significance for Bihar's agricultural economy in that it is one of the primary sources of rural employment, incomes, and linkage with related industries such as the development of dairy sector. Bihar has been known as one of India's prominent producers of sugar over its history with 33 sugar mills contributing up to 40 per cent of sugar produced in India in 30 years from the inauguration of the first factory in 1904. In 1939-40, Bihar was the second largest producer of sugar after Uttar Pradesh with the total Indian production of sugar being at 12.08 lakh tons and contribution from Bihar being about 3.22 lakh tons or 26.7 per cent of the total national production. But now due to various factors, the production by the state has dropped to about 4 per cent of the national output. These factors include agro-ecological constraints, infrastructural issues and institutional problems. Of all these, the problem of waterlogging in the cane farming areas of the state stands out prominently. The issue has been exacerbated by unplanned infrastructure development, including road and railway embankments that obstruct natural drainage systems as well as seasonal flooding and excess water discharge from upstream regions in Nepal during the monsoon period. These conditions have already impacted crop growth, reduced cane quality and discouraged farmer participation in sugarcane cultivation (Singh et al., 2023). At present, the contribution of Bihar towards sugar production in India is a mere 4 per cent. In spite of the above-stated constraints, Bihar still holds the scope to rejuvenate the sugarcane industry on account of its rich alluvial soil, favourable agro-climatic environment, and availability of plenty of water from the river Ganga and its tributaries. With the help of these strengths coupled with proper policy measures, improvement in drainage system, adoption of cultivation methods resilient to climatic changes, and institutional improvements, there exists an immense scope for the sustainable rejuvenation of the industry. This calls for urgent policy re-examination to overcome the prevailing constraints, namely low cane productivity, poor quality of cane produced, financial burden on sugar mills, and lack of integration of supply chain. On the other hand, new avenues should also be explored. This paper seeks to evaluate the difficulties and prospects within the sugarcane economy of Bihar and identify some possible interventions that would

[1]ICAR-Indian Sugarcane Research Institute, Lucknow-226 002 (UP)
[2]Bihar Agricultural University, Sabour-813210 (Bihar)
[*]Corresponding Author E-mail: ashutoshkumarmall@gmail.com

facilitate sustainable revival of the sector and boost economic growth.

Agro-Ecological Suitability of Bihar for Sugarcane

As per the Planning Commission (now NITI Aayog), Bihar is placed within under Agro-Climatic Zone-IV (Middle Gangetic Plains Region), characterized by variable climatic conditions (from semi-arid to sub-tropical climate). Additionally, there are four internal Agro-climatic sub-zones inside the state based on soil characteristics, precipitation, temperature gradients, and topographical variability. Zones I and II fall to the north of the Ganges River, while Zones III and IV cover the southern parts. In context of sugarcane research and varietal development, Bihar falls under the North Central Zone of the All India Coordinated Research Project (AICRP) on Sugarcane, which also includes eastern Uttar Pradesh and West Bengal.

Two agro-climatic zones have been identified in India where sugarcane can be grown and these include the tropical zone (Maharashtra, Karnataka, Gujarat, Tamil Nadu) and subtropical zone, while Bihar comes under the latter region which is responsible for the growing schedule and sugar extraction process of sugar cane. Sugarcane is a crop that is a tropical one but succeeds well in the sub-tropical climate of Bihar. While sugarcane is a tropical crop, it is known to require temperatures of 28-32oC, 75-150 mm rainfall annually, and high humidity levels of 80-85 per cent. The average annual temperature of Bihar is 25.2°C, with warm summers, cold winters, and moderate rainfall with maximum rainfall being observed in the month of July.

For sugarcane, the Agro-Ecological potential of Bihar heavily depends on soil characteristics and drainage properties. The soils in North Bihar, including the Middle Gangetic Plains, are primarily calcareous alluvium soils used for the growing of sugarcane. Analysis of soil characteristics of Samastipur (Agro-Climatic Zone-I) showed that the soils are mainly sandy clay loam and sandy loam in texture, alkaline in reaction, and free from salinity issues. Nonetheless, the following limitations were identified in the analysis conducted: low organic carbon content (0.26–0.61 per cent), low nitrogen content (142-276 kg ha-1), and limited availability of phosphorus (19-35 kg P_2O_5 ha-1). Furthermore, poorly drained Aquepts (Aerie Epiaquepts and Vertic Epiaquepts), which are common in parts of the Indo-Gangetic plains, have marginal suitability to total unsuitability for sugar cane planting due to their tendency towards waterlogging, poor permeability, and susceptibility to floods (Minnatullah et al., 2024). Contrarily, soils suitable for productive sugarcane production are characterised by deep, well-drained, loamy to clay-loam soils with neutral reaction in the north-western alluvial plains (West Champaran, Gopalganj, and Muzaffarpur).

Sugarcane cultivation in Bihar exhibits strong geographical concentration, primarily in North Bihar districts, including West Champaran (Harinagar, Bagha, Narkatiaganj, Sugauli, Madhopur), East Champaran, Samastipur (Hasanpur, Rosera), Muzaffarpur (Pusa), Gopalganj, and Siwan.

Out of the state's 38 districts, only seven districts (West Champaran, Gopalganj, East Champaran, Siwan, Samastipur, Sitamarhi, and Bhagalpur) contribute over 80.95 per cent of the total sugarcane production highlighting a highly clustered agro-industrial structure. Among them, West Champaran is the leading sugarcane-producing district, contributing nearly 60 per cent of the state's total sugarcane production. Following this is Gopalganj district that produces 21.43 per cent of the sugarcane production in the state. Other major sugarcane producers among these seven are Sitamarhi (7.90 per cent) and Samastipur (4.94 per cent). These four districts contribute to nearly 94 per cent of the state's sugarcane production.

Bihar is still a significant producer of sugarcane crops in India with around 2.5 lakh hectares of area dedicated to sugarcane production along with 11 functioning sugar mills in comparison to 35 in the 1930s. Despite the presence of favourable agronomic and ecological conditions, productivity continues to be sub-optimal for Bihar with state productivity being only about 50 t ha-1, national average being 68-70 t ha-1 which is much lower when compared to states such as Tamil Nadu whose productivity is at over 100 t/ha (Kumar et al., 2023). Sugar recovery percentage however has improved considerably with 10-11 per cent recovery being par with national average owing to technological advances in seed variety and processing techniques.

Sugarcane Area, Production and Productivity in Bihar

An analysis of the past ten years suggests that production trend in the region has been unstable, with a steady decrease in the acreage utilized (Table 1). It is observed that the maximum production has been noted during 2018-19 having the quantity of 201.2 lakh tonnes, after that, the production began to fall and instability occurred, reaching its lowest level during 2024-25 having a quantity of 118.1 lakh tonnes, and then again rose up to 140.6 lakh tonnes during 2025-26. On the contrary, the area under sugarcane cultivation also fell from 2.4 to 1.9 lakh hectares (2024-2025). The main reason behind this decrease may include diversified agriculture, lack of profitability in the crop, water deficiency, delayed payment of farmers by sugar factories, and changing trends towards other crops. The largest decline in the cultivation of sugarcane was observed during 2024-25 (-8.4%). However, there has been an increase.

Six out of the thirty-eight districts of Bihar including West Champaran, East Champaran, Gopalganj, Sitamarhi, Siwan, and Samastipur comprise about 79.9 per cent of the successful region based on area growth as well as productivity. These six regions contribute to almost 70 per cent of the cane area as well as 60 per cent of cane production in the state and are served by 12 out of 28 sugar factories in Bihar.

Table 1: Trend in Sugarcane Area, Production, Productivity and Annual Variation in Bihar (2015-16 to 2025-26)

Years	Production (lakh/ tonnes)	Production variation (%)	Area (lakh/ha)	Area variation (%)	Yield (t/ha)	Yield variation (%)
2015-16	126.5	-9.9	2.4	-4.1	51.9	-6.1
2016-17	130.4	3.1	2.4	-1.8	54.5	4.9
2017-18	138.3	6.1	2.3	-2.4	59.2	8.7
2018-19	201.2	45.5	2.3	-3.5	89.2	50.8
2019-20	135.8	-32.5	2.2	-0.7	60.7	-31.9
2020-21	121.1	-10.8	2.2	-1.2	54.8	-9.7
2021-22	120.3	-0.7	2.1	-4.5	56.9	3.9
2022-23	127.4	5.9	2.1	-0.5	60.6	6.5
2023-24	120.8	-5.2	2.0	-3.8	59.8	-1.4
2024-25	118.1	-2.3	1.9	-8.4	63.8	6.7
2025-26	140.6	19.1	1.9	7.6	70.7	10.7

There has been a wide disparity in the land utilized for planting, production, and productivity of sugarcane between Bihar and Uttar Pradesh (UP) during the last five years from 2020-21 to 2025-26 (Table 2). Uttar Pradesh ranked among the major producers as it produced a total amount of 1783.4 lakh tonnes, while its production increased to 2329.6 lakh tonnes during 2025-26. It accounts for about 44.5 per cent of the total national production, indicating the dominating position of UP in the sugarcane industry. Large areas of land have been used in planting, including 21.8-28.0 lakh ha, along with very high production of over 80.0 t ha-1 throughout these periods. The contribution made by Bihar to the national sugarcane production has been meagre during these years, ranging from 118.12 to 140.63 lakh tonnes. In this regard, the contribution made by Bihar is only 2.6-3.0 per cent of the total national production. The productivity of sugarcane in Bihar was in the range of 54.8 to 70.6 t ha-1 while that of Uttar Pradesh was higher at the range of 80.0 to 83.0 t ha-1. Even though there were some positive changes in the productivity of Bihar recently, the yield difference of 10-15 tons ha-1 persists.

There are many causes for this yield difference, and among them is the usage of improved varieties, insufficient irrigation facilities, less machinery availability, pests, disease attacks, and inadequate linkage of farmers to the industries. In addition to all this, the industrial facilities available in Bihar are not so developed when compared to UP, which makes the farmers hesitant to cultivate the crop. Hence, even though there is a significant increase in the production of sugarcane in the state of UP, Bihar has failed to progress in the same area.

Table 2: Contribution of Bihar to National Sugarcane Production, Area and Yield in Comparison with Uttar Pradesh (2020–21 to 2025–26)

Years	States	Production (lakh tonnes-1)	Area (lakh ha)	Yield (Kg ha-1)
2020-21	India	4053.9	48.5	83.6
	Uttar Pradesh	1783.4	21.8	81.8
	Bihar	121.1	2.2	54.8
2021-22	India	4394.3	51.8	84.9
	Uttar Pradesh	1791.7	21.8	82.3
	Bihar	120.3	2.1	56.9
2022-23	India	4905.3	58.7	83.3
	Uttar Pradesh	2242.5	27.9	80.2
	Bihar	127.4	2.1	60.6
2023-24	India	4531.6	57.4	78.9
	Uttar Pradesh	2158.1	26.5	81.3
	Bihar	120.8	2.0	59.8
2024-25	India	4501.2	53.6	84.0
	Uttar Pradesh	2129.2	25.9	82.3
	Bihar	118.1	1.9	63.8
2025-26	India	5001.9	58.5	85.5
	Uttar Pradesh	2329.6	28.0	83.1
	Bihar	140.6	1.9	70.6

Sugarcane based production systems of Bihar

Even though sugarcane based cropping systems occupy small area in Bihar, they are of considerable importance in the agricultural system of the state. The crop's ability to be cultivated within the kharif as well as the rabi cropping systems because of different planting times and the economically significant value of sugarcane farming for poor as well as well-to-do farmers make it a crucial part of various important cropping systems in the state. For Bihar conditions, almost 40 per cent of sugarcane farms undergo the waterlogging phase for one or two months in the kharif season, which results in reduced yield. However, during the summer, the crop experiences severe moisture stress creating the situation similar to drought. As a result, alternating flood-drought conditions are the main difficulties in sugarcane cultivation in Bihar. Nevertheless, the cultivation of this crop has certain advantages because of the inherent characteristics of the crop itself. Sugarcane farming has better tolerance to adverse conditions than other crops, is responsive to better input and cultivation management, and has a positive

influence on weed seed bank as well as soil organic matter content. It is due to such features that sugarcane continues to be one of the key crops for inclusion in crop rotation programs, especially within the integrated agro-ecological regions of the state. Sugarcane is well suited for integration into kharif and rabi systems owing to its flexible planting time. Sugarcane integrates effectively into both kharif and rabi systems through flexible planting schedules. Some of the common cropping sequences involving sugarcane in Bihar include: rice–autumn sugarcane–ratoon–wheat; rice–mustard–spring sugarcane–ratoon–wheat; maize–sugarcane–ratoon–wheat; rice–sugarcane–ratoon –sesame; rice–sugarcane– ratoon–rice; and dhaincha (green manure)–sugarcane–ratoon–wheat.

Besides its compatibility with different cropping sequences, sugarcane also provides excellent opportunities for intercropping. The wide row spacing (60–90 cm), delayed sprouting period (30–45 days), slow initial growth, and the crop's ability to compensate for tiller loss caused by intercrops make it suitable for intercropping systems. As a result, farmers successfully grow grain legumes, oilseeds, potato, and maize as intercrops in the plant crop, while forage legumes are commonly cultivated in winter-initiated ratoon crops

Varietal Development and Adoption in Bihar

Development of sugarcane varieties is the backbone for increasing cane productivity and sugar recovery in Bihar. The ICAR–Indian Sugarcane Research Institute Regional Centre, Motipur (Muzaffarpur) and the Sugarcane Research Institute, Dr. Rajendra Prasad Central Agricultural University, Pusa have contributed significantly in varietal evaluation, development and dissemination of improved cultivars suited to the agro-climatic conditions of Bihar. The introduction of Coimbatore seedlings in the early 1920s marked the start of scientific varietal improvement in the state. However, Co 210 and Co 213 quickly replaced the local varieties due to higher yield and sugar content and by early 1930s they accounted for nearly 80 per cent of the sugarcane area in Bihar. Later Co 331 and Co 313 were released in 1934 and helped in reviving the sugar industry after the red rot epidemic of 1939-40 destroyed Co 210 and Co 213.

The Regional Centre, Motipur, established in 1988 and merged with ICAR–Indian Sugarcane Research Institute, Lucknow in 2004, has made notable contributions to sugarcane improvement in the North Central Zone through varietal development and evaluation, screening for red rot resistance, identification of waterlogging-tolerant genotypes and production of quality seed material for eastern India. Some of the commercially successful varieties are Co 87268, Co 89029 and Co 0232 (early group) and Co 0233 (mid-late group), which have been developed and popularized through the coordinated breeding programme and have been widely adopted in Bihar due to their superior yield potential, sugar recovery and resistance to major diseases. In recent times, varieties like CoLk 12207, CoLk 12209, CoLk 15466, CoLk 16466 and CoLk 16470 have further reinforced varietal diversification and seed replacement programmes in Bihar and the neighbouring states.

The Sugarcane Research Institute, Pusa also made a remarkable contribution in the improvement of sugarcane by developing BO and CoP series varieties. CoP 9301, BO 130, BO 139, BO 153 and CoP 112 are some of the early maturing groups and have been adopted widely due to high cane yield and sugar content. Similarly, BO 91, CoP 9206, CoP 9302, CoP 9702, BO 141, BO 146, CoP 2061 and BO 154 also continued to be popular among mid-late maturing cultivars for their adaptability and stable performance under Bihar conditions. These varieties have played a great role in improving the cane productivity and sugar recovery and have contributed substantially in the revival and sustainability of the sugar industry in Bihar (Minnatullah et al., 2014; Kumar, 2020). Continuous varietal replacement and diversification through the combined efforts of ICAR-ISRI Regional Centre, Motipur and SRI, Pusa have enabled Bihar to maintain productivity and meet the challenges posed by diseases and changing climatic conditions.

Agronomic Practices and Crop Management

Many agricultural and management practices have been suggested to enhance the productivity of sugarcane production in Bihar. Scientific drainage by constructing open ditches for avoiding waterlogging and preventing any crop damage from excessive moisture conditions. Advising farmers to adopt autumn planting during October-November months so that optimum growth of the crops takes place before the beginning of the monsoon season. Using trench planting technique as an alternative to conventional furrow planting, especially in waterlogged areas owing to the positive effect on increased crop yields and root aeration. Nutrient management, with 25-30 per cent more use of nitrogen fertilizer in case of waterlogged fields, along with foliar nitrogen.

Promotion of waterlogging tolerant varieties such as BO 91, BO 110, BO 137, BO 154, CoP 9301 and CoLk 94184 for region specific adaptability and yield stability. Strengthening integrated weed management including trash mulching, mechanical hoeing and use of herbicides such as atrazine and 2,4-D can effectively control weeds. Adoption of improved management of the ratoon crop by performing activities like stubble shaving, gap filling, fertilization and irrigation for higher yields from ratoon crops. Such practices will help improve the plant rooting, drainage, prevent lodging and achieve high yield of grain.

Biotic Stress Factors Affecting Sugarcane in Bihar

a) Insect Pests

This pest has been classified broadly into different categories depending upon its feeding behavior such as borers, sucking pest, subterranean pests, defoliators, and non-insect pest. There are six species of Lepidopterous larvae that come under the category of borers which affect the sugarcane crop in Bihar. These pests of borers include early shoot borer (Chilo infuscatellus), stalk borer (Chilo auricilius), spotted stalk borer (Chilo partellus), top borer (Scirpophaga excerptalis), plassey borer (Chilo tumidicostalis) and pink stem borer (Sesamia inference). The plassey borer is one of the major pests affecting sugarcane crops in Bihar. As topography in Bihar comprises mostly plain regions where there is water stagnation along with heavy rainfall in the rainy season. Rainfall plays major role for the multiplication, the high humidity in the August month helps in the rapid build-up of the pest. The ratoon crop is highly susceptible to attack by the plassey borer, thereby necessitating the need for pest monitoring on ratooned crops. Kumar et al. (2023) showed that there was a very high infestation rate of the plassey borer where 82.3 per cent incidence was recorded in the sugarcane stalks in Bihar. Two to three broods have been reported in Bihar in 1959 six broods were reported at Plassey, West Bengal. The larva undergoes two infestations; the first one occurs at an early stage and is referred to as the gregarious phase, while the other one occurs in the later stages and is called solitary phase. Another common sugarcane pest in Bihar is the top borer. A typical symptom associated with this pest involves the dead heart phenomenon and shot holes in the leaves. As a result, side shoots develop causing the sugarcane to have a bunchy top. There are four instars of the larvae of this insect pest. Once hatched, the larvae bore into the midrib of the leaf. The average mean duration of the life cycle of the pest has been estimated to be between 42-52 days in Bihar . In India, the loss in sugarcane productivity and sucrose contents due to Plassey borer were estimated to be between 8.2 and 12.6 per cent and between 10.7 to 48.6 percent, respectively in Bihar. The incidence level and yield loss in sugarcane due to major borer infestation at Samastipur, Bihar (Table 3).

Table 3: Incidence Level and Yield Loss Attributed to Major Borer Infestation in Sugarcane Fields of Samastipur, Bihar

Major borer Insects	2014-15	2015-16	2016-17
Early shoot borer	20.6	13.1	17.4
Top borer	18.4	30.9	35.8
Stalk borer	18.3	20.5	26.0
Sugarcane Yield (t ha-1)	68.9	67.6	72.6

(Source: Chand et al., 2018)

Sucking pests group includes such pests as Pyrilla, white flies, scale insects, mealy bugs, plant hopper (Eoeurysa flavocapitata), plant hopper, and black bug among others. Black bug attacks are most common in the ratoon crop. These bugs can be active all year round. Nevertheless, their infestation intensifies during periods when the overwintering bugs' population is high and conditions after winter are mild. The bug population reduced drastically during the rainy period. It was further noted that rainfed sugarcane plants were affected more severely by these pests than irrigated sugarcanes.

b) Major Diseases

Some of the major sugarcane diseases recorded in the state of Bihar during the last five years are red rot, Pokkah boeng, and wilt. Apart from Pokkah boeng, wilt disease cases have shown a significant increase in Bihar during the last five years. It was observed that the incidence of Pokkah boeng disease is more common during the monsoon season from July until mid-September. The conditions prevailing in the environment such as comparatively cooler temperature, humidity, and rainfall favor the onset of this particular disease in Bihar. Furthermore, insects like the top borer can create the same symptoms as Pokkah boeng disease. Incidence studies of the diseases in Bihar during the last five years have revealed that the occurrence of various diseases, including wilt, red rot, Pokkah boeng, smut, yellow leaf disease, and mosaic, is high in major districts growing sugarcane in Bihar. Out of these, the two most threatening diseases were found to be red rot and wilt, having a percentage occurrence between 2–30 per cent in major districts like Gopalganj, Sitamarhi, Samastipur, and West Champaran (Table 5). The popular cultivars of sugarcane, especially Co 0238, Co 0118, BO 154, and CoP 2061, are highly prone to multiple diseases. Occurrence of seasonal studies shows that almost all of these diseases are highly common during the months of July to December, owing to favourable humidity levels at this period (Sanskriti et al., 2025).

c) Integrated Pest and Disease Management

The fast detection and an effective management strategy are required for thriving and healthy sugarcane field in Bihar. Since climate change has turned into a continuing process, and this phenomenon varies in each region, there is a necessity to know the pattern of pest attack on crops along with its variety and intensity within a particular state. Further, it can be predicted that the incidence of pests will soon spread outside their usual geographical boundaries. Not only have the survival rate of pests undergone changes due to higher survival rate in over wintering, number of generations increased, loss in synchronization between plants and pest, vector mediated plant disease and low biological control efficacy (Kumar et al., 2023), but also there is an expansion of scope for new formulations for their management strategy,

like IPM techniques, proper pest monitoring and effective forecast model designing.

Due to the high sensitivity of the IPM to changes in the weather, climate smart pest management (CSPM) has developed as an innovative method of pest management that uses principles almost similar to those of IPM. CSPM takes into account the impact of climate change on pest management practices. The approach is founded on three main principles of climate smart agriculture: adaptation, mitigation, and productivity enhancement. CSPM focuses on the effects of climate change on various aspects of the agricultural production system as well as the ecosystem as a whole. Furthermore, CSPM advocates for sustainable pest management practices through the minimization of the impact of pests on crops. This makes the system resilient to climate change while lowering the use of chemicals such as pesticides. Another important aspect of pest management practices is monitoring, which marks the first step toward pest control. Methods of pest surveillance may include visual observation, trap usage, sampling, scouting, biological surveillance, as well as remote sensing methods. In addition to surveillance, pest forecasting is a major tool utilized in preventing pests' outbreaks in agriculture. The forecasting system serves as an early warning mechanism which allows farmers to foresee potential pest problems in advance.

Table 4: Recommended newer sugarcane varieties for Bihar State

SN	Varieties	Parentage	Year of Release	Yield (t/ha)	CCS (t/ha)	Sucrose (%)	Specific characteristics
Early Maturing							
1.	CoLk 12207	CoLk 8002 GC	2019	75.4	8.74	16.9	Improved sugar content/yield; excellent ratoon ability & productivity
2.	CoLk 94184	CoLk 8001 self	2008	76.0	9.3	18.0	MR to RR; tolerant to drought & waterlogging & Good Ratooner
3.	CoLk 15466	CoS 8436 GC	2022	85.9	10.4	17.5	MR to RR; lodging tolerant; multiple ratooning & lush green top at maturity
4.	CoLk 16466	BO 91 × Co 86002	2023	85.4	10.2	17.3	MR to RR; suitable for wider row spacing & intercropping & responsive to higher dose of N
5.	CoLk 14201	Co 0238 GC	2023	81.9	10.6	18.7	Best suited for autumn planting, with high tillering ability and good ratooning potential
6.	Co 98014	Co 8316 x Co 8213	2007	76.3	9.3	17.6	MR to RR; tolerant to drought & waterlogging; suitable for co-generation.
7.	Co 0118	Co 8347 x Co 86011	2009	78.2	9.9	18.5	MR to RR; tolerant to drought & waterlogging
8.	Co 15023	Co 0241 x Co 8347	2021	92.2	12.3	19.2	MR to RR; offering higher profitability, increased recovery
9.	CoP 9301	CoC 671 x BO 99	1996	88.0	10.5	18.2	Suitable for all soil types; high cane yield and sucrose content; early maturity; low incidence of insect-pests and diseases; Good for Jaggery & Waterlogging tolerant
10.	BO 153	BO 131 Self	2011	87.0	10.4	17.4	High cane yield and sucrose content; medium-thick cylindrical internodes; semi-drooping green leave; Waterlogging tolerant
11.	CoP 112	BO 91 x Co 62198	2015	96.5	11.9	17.5	MR to RR & R to Pokkah boeng; Waterlogging tolerant; high sugar recovery
12.	CoP 16437	CoSe 92423 x Co 1148	2020	101.0	11.8	18.2	Early maturing and Good for Jaggery
13.	CoS 13235	MS 6847 x Co 1148	2019	82.9	10.5	18.2	Suitable for winter plantings; Early maturing with high sucrose content
Mid Late Maturing							
1.	CoLk 12209	LG 95053 x CoPant 90223	2019	77.5	9.4	17.6	Improved sugar content/yield; excellent ratoon ability & productivity.
2.	CoLk 16470	CoS 8436 x CoSe 92423	2024	82.5	9.6	17.4	Suitable for irrigated condition, waterlogging tolerant, MR to RR, smut, least susceptible to major insect-pests
3.	CoP 09437	BO 55 x BO 43	2021	77.7	9.4	17.6	Resistant to red rot, smut & wilt; Tolerant to lodging

MR: Moderate resistance; RR: Red rot

Table 5: Distribution and Incidence of Important Sugarcane Diseases in Bihar

Disease	Variety/Varieties	Incidence (%)	Location(s)	Season	Year/Period
Wilt	Co 0238; Co 0118; Co 0233; CoP 9301; CoP 2061; Co 0235; BO 141; BO 154; Co 98014; BO 128; CoLk 94184; CoSe 92423; BO 110	2–60	Lauria; Gopalganj; Suguali; Sidhwalia; Riga; Majhaulia; Madhopur; Narkatiaganj; Hasanpur; Raibari Mahuwa, Harinagar	July– December	2018–2023 & seasonal survey
Red rot	Co 0238; Co 0118; Co 0235; Co 0233; BO 154; BO 128; CoSe 95422; CoSe 92423	2–30	Lauria; Riga; Madhopur; Sidhwalia; Gopalganj; Belhaiya, Kutripur, Mahua Narkatiganj; Raibari Mahuwa, Harinagar; Majhaulia	July– December	2018–2019 to 2020–2021 and seasonal survey
Pokkah boeng	Co 0238; Co 0118; Co 0233; CoP 2061; BO 141; BO 153; BO 154; BO 147; BO 146; BO 137; BO 110	2–20	Pusa; Sidhwalia; Majhaulia; Narkatiaganj; Gopalganj; Suguali; Hasanpur; Riga; Kalyanpur	July– December	2018–2019 to 2022–2023 & seasonal survey
Smut	Co 0238; Co 0233; Co 233; CoP 2061; BO 141; BO 154; BO 147; BO 128; BO 146; BO 137; CoSe 95422; CoSe 92423	2–15	Pusa; Sidhwalia; Majhaulia; Narkatiaganj; Riga; Hasanpur; Kalyanpur;	May–June	2018–2019 to 2022–2023 & seasonal survey
Yellow Leaf Disease	Co 0238; Co 0233; Co 0118	1–2	Pusa; Sidhwalia; Majhaulia; Narkatiaganj; Hasanpur; Gopalganj; Belhaiya, Kutripur, Mahua Bhusa Raibari Mahuwa, Harinagar	-	2018–2019 to 2019–2020
Mosaic	Co 0233; Co 0118	2–25	Gopalganj; Riga; Gopalganj	-	2019–2020
Leaf spot	Co 0118; Co 0233	2–25	Gopalganj	September–December	2019–2020 & seasonal survey
Ratoon Stunting Disease	CoLk 94184	–	Sidhwalia	-	2018–2019
Grassy shoot disease	BO 128; CoSe 95422	2–5%	All states	July–December	Seasonal survey
Red stripe	BO 147	2%	All states	July–August	
Sett rot	BO 137	5%	All states	May–June	

(Source: Minnatullah et al., 2014; Minnatullah et al., 2021)

With information about climatic trends, pests' biology, and other factors analysed by the forecasting models, farmers can receive forecasts regarding time and place of pests' appearance and take necessary measures to prevent such outbreaks from occurring. On the basis of forecasting data, one can implement an adaptive pest management system and manage pest problems effectively. Pest forecasting provides opportunities for optimal resource management since unnecessary pesticides will not be applied. Farmers will have enough time to implement pest management measures focusing on the most vulnerable sites. Therefore, farmers can reduce their reliance on chemical pest control and implement other methods (Kumar et al., 2023).

Push-Pull technique is another method used in the sugarcane crop as part of pest management practices (Fig. 1). This type of method involves the use of behaviour of insects and pests as well as their natural enemies. Under the push pull strategy, the aim of this technique is to create an environment whereby the pest is pushed away from the main crop and drawn to another attractive point where the pest can be easily eliminated. The push pull strategy is usually combined with cultural and biological control methods. In the case of sugarcane, this strategy is employed to control the African sugarcane borer. The repellent used in this case is molasses grass while the attractant is Bt. maize. The larva after hatching dies by feeding on the Bt. maize (Kumar et al., 2023). The conservation of natural enemies can be considered as one of the key techniques in biological pest management. The technique is usually applied to crops that have lesser economic value and those which can withstand considerable levels of pest damages. Nevertheless, it is necessary to understand that if

the economic injury level of any crop is quite low, then the sole dependence on the technique may be fruitless. Being a long-lasting crop that favors different kinds of weed growth, sugarcane becomes an ideal place to implement the conservation based pest management approach. Additionally, sugarcane can tolerate a certain amount of pest attacks without suffering considerable yield loss. In order to apply this approach successfully and increase the numbers of natural enemies in crop ecosystem, it is required to learn about the factors affecting the survival of these organisms. The first thing that affects negatively natural enemies is their exposure to chemical insecticides that kill both pests and beneficial organisms. Another factor that impacts significantly the survival rate of natural enemies is the presence of sufficient amounts of pollen and nectar sources. Hence, judicious use of insecticides that are less harmful to beneficial insects may facilitate the sustenance of natural enemies. Further, growing flowers that provide nectar and pollen in the vicinity of sugarcane farms would serve as vital sources of food and refuge to natural enemies, thus conserving their populations through biological pest management (Kumar et al., 2023).

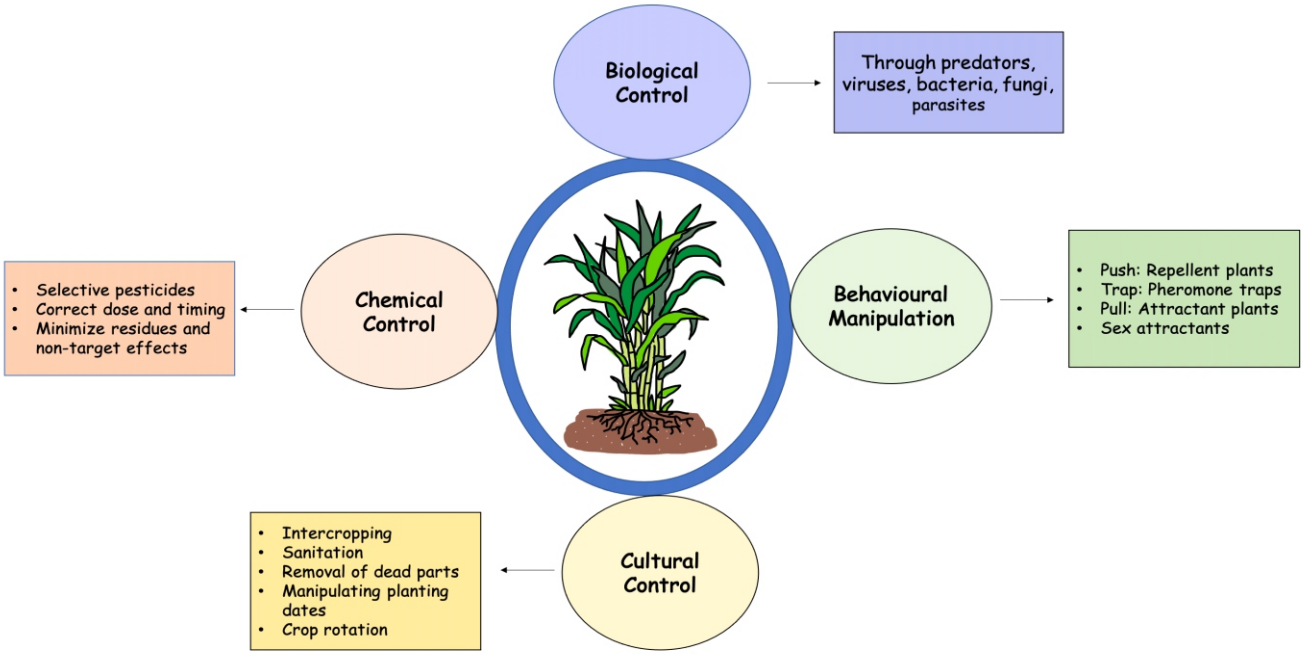


Fig. 1: Integrated pest management of sugarcane for Bihar

Management of diseases in sugarcane requires an integrated approach. Integrated management is a crucial strategy that ensures sustainable cultivation of sugarcane within the state. Disease-free seed setts from healthy nurseries is the primary form of preventive management of sugarcane diseases. Hot water treatment, which entails soaking seeds at 50°C for 30 minutes, or use of fungicidal sett treatment through application of carbendazim or Bavistin eliminates seed borne diseases. Disease resistant varieties, timely planting, field sanitation, and removal of infected clumps are crucial cultural methods of controlling diseases. Healthy seed canes play a crucial role in controlling sugarcane diseases. Diseases are highly likely during ratoon crops; hence harvesting early and refraining from ratooning is recommended, especially in wilt. Growing sugarcane in monoculture on vast areas is ideal for development of disease pathogens. To counter this, cropping rotations involving green manure crops should be done. Sugarcane is commonly rotated with paddy in disease prone environments. Moreover, intercropping of sugarcane along with coriander is an excellent method for controlling wilt disease in sugarcane. The occurrence of wilt disease is associated with factors like water logging, drought, and borer insects. Hence, it becomes very important to follow appropriate practices to prevent such abiotic stresses. Biological control using Trichoderma spp., which are organisms that control soil pathogens, is now widely practiced. Chemical control is used in case of necessity only. Disease management techniques, along with better cultivars and increased awareness among farmers, can help to prevent diseases.

Abiotic Stress Factors Affecting Sugarcane in Bihar

Waterlogging is one of the major limitations in achieving optimal yields of sugarcane in Bihar. The magnitude of damage due to waterlogging is governed by many factors like location, water logging depth and duration, water flow, aerial root formation, growth stages, soil properties, and sugarcane varieties cultivated. BO 147 varieties had the capability to withstand waterlogging stress conditions in Bihar. They showed high performance with regard to high numbers of

millable canes and cane yield (Kumar et al. 2015). Kumar et al. (2021) revealed that waterlogging for a period of time, particularly during the grand growth period (July-September), greatly reduced plant height by 9.4 per cent, cane diameter by 13.4 per cent, number of millable canes by 13.8 per cent, and cane weight by 15.7 per cent in comparison with normal conditions. Furthermore, Sanghera and Jamwal (2019) indicated that continuous waterlogging for a period of three months led to 38 per cent leaf biomass reduction and 4-15 times greater adventitious root development. Waterlogging limited the development of plants in terms of fewer tillers, millable canes, and cane yield. Moreover, inadequate management of ratoon crop is also another contributing factor for low productivity.

Sugarcane is a long-duration crop requiring large quantities of water and is highly vulnerable to changes in rainfall distribution. Although the average annual rainfall in Bihar is generally adequate for sugarcane cultivation, its uneven spatial and temporal distribution frequently induces drought stress during critical growth stages (Sharma et al., 2025). Pre-monsoon rainfall is often insufficient, delaying planting and germination, while prolonged dry spells of 10-20 days during the monsoon season reduce soil moisture availability and adversely affect tillering, stalk elongation, leaf area development and sucrose accumulation. Deficiency of post-monsoon rainfall further aggravates moisture stress during the grand growth and maturity phases, causing significant reductions in cane yield and juice quality (Mall et al., 2017). The problem is particularly acute in north Bihar, an important sugarcane-growing belt traditionally prone to floods and waterlogging due to the Himalayan rivers such as the Kosi, Gandak, Bagmati and Burhi Gandak. However, rapid recession of floodwaters, erratic rainfall distribution and prolonged intra-seasonal dry spells frequently expose sugarcane fields to drought episodes despite periodic flooding (Kumar and Pareek, 2024). Consequently, sugarcane crops often experience alternating cycles of excess moisture and water deficit within the same crop season, adversely affecting root growth, nutrient uptake, photosynthetic efficiency and cane productivity. The increasing frequency of these climatic extremes under changing climate scenarios necessitates the development of sugarcane varieties with combined tolerance to drought and waterlogging, along with improved water management practices to sustain productivity in the sugarcane belt of Bihar (Kumar and Pareek, 2024).

Sugar Industry and Supply Chain in Bihar

In Bihar, there are 18 non-functioning sugar factories, out of which 15 had been managed by the Bihar State Sugar Corporation. Recently, GoB has sanctioned a proposal in November 2025 for restarting nine non-functioning sugar mills as well as establishing 25 new sugar factories. The government is working on bringing back to life nine sugar factories with an initial start-up in Sasamusa sugar factory in the district of Gopalganj. Other sugar factories like the one in Warisaliganj are being considered, while proposals related to Raiyam and Sakri sugar factories in the districts of Darbhanga and Madhubani, respectively, are still pending before the state cabinet for approval. The National Federation of Cooperative Sugar Factories (NFCSF) has taken initiatives to establish new sugar cooperatives in Bihar, with initial groundwork in progress for Raiyam sugar mill in the district of Darbhanga.

The Bihar government has increased the state advised price (SAP) for sugarcane for the 2025–26 crushing season. The SAP is fixed at Rs 380 quintal-1 for super grade, Rs 360 quintal-1 for general grade, and Rs 330 quintal-1 for low-grade varieties at mill gates. This aligns with the state's objective to ensure rates comparable to UP, where the price is around Rs 400 quintal-1. However, the minister noted that forcibly increasing rates could lead to delayed payments, which would harm farmers. For the 2024-25 sugar season, the Bihar government raised the prices of all sugarcane varieties by Rs 10 quintal-1, resulting in farmers receiving Rs 365 quintal-1 for the best quality sugarcane. The central government has also announced an 8 per cent increase in the fair and remunerative price (FRP) of sugarcane. The revised FRP is set at Rs 340 quintal-1, effective from October 1, 2024, for the 2024–25 sugar season. Under this framework, sugar mills are required to pay a minimum of Rs 340 quintal-1 at a sugar recovery rate of 10.3 per cent. A premium of Rs 3.3 quintal-1 will be provided for every 0.1 per cent increase above a 10.3 per cent recovery rate. On the other hand, in case there is a 0.1 percent reduction in recovery, there will be a corresponding reduction. In cases where sugar recovery goes below the required rate, farmers will receive FRP of at least Rs 315.1 quintal-1 even when the recovery rate is 9.5 percent. The Government of Bihar (GoB) is making efforts to set up new sugar mills and to reopen some that have been closed, in order to create more employment opportunities and stop migration of people from Bihar. The Sugarcane Industries Department has written to district collectors of 25 districts, asking them to locate and procure land for new sugar mills. These districts include Muzaffarpur, Gopalganj, Samastipur, Gaya, Sheohar, Siwan, Rohtas, Motihari, West Champaran, and Patna. The government of Bihar has set a target of providing employment to 1 crore youth in the next five years, through setting up of new sugar mills. A committee headed by the Chief Secretary of the State Government has also been set up to study the present situation of sugar mills and make suggestions. The NFCSF has been working hand in hand with the Government of Bihar to revive closed sugar mills and establish new cooperative units.

In order to counter such worries about the reluctance of the farmers towards sugarcane farming, the department is holding seminars and coming up with schemes for farmers,

besides talking to cultivators regarding their problems. It may be mentioned here that rates in Bihar are fixed in accordance with the consent of private limited sugar mills in Bihar. It may also be mentioned that 84.0 per cent farmers in Bihar get their payments for sugarcane within 15 days. The State Cooperative Department in Bihar entered into an agreement with mills, saying that the mills will have to pay 15.0 per cent interest on FRP delayed payments for 2025-26. The government of Bihar has taken several initiatives in terms of developing the sugarcane industry of Bihar as well as increasing the income of farmers by providing a 50 per cent subsidy on sugarcane seeds for farmers having five acres or below.

Major Constraints in Sugarcane Production in Bihar

The growing of sugarcane in Bihar faces several constraining factors that have a negative impact on the performance of the crop in terms of yield and productivity. Some of the major constraining factors that confront the growing of sugarcane are the prevalence of water logging in wide areas during the monsoon season. The use of better agronomic technologies and the use of better variety of sugarcane crops is another problem. The scarcity of irrigation facilities, especially during the pre-monsoon season, contributes to poor crop performance. Some other major challenges include ineffective weed control, little practice of intercropping, and very few planted areas during autumn. Effective plant protection strategies and practices including earthing-up and propping are not practiced adequately by the growers. Sugarcane is cultivated in marginal lands, and poor balance of fertilizer application is another challenge facing its cultivation in Bihar. Limited extension activities targeting growers and ineffective interactions among other constraining factors play an important role in the performance of sugarcane crops. Several varieties are now being introduced in various cane growing zones in Bihar without any recommendation and evaluation of their resistance to different diseases. This practice is increasing the load of inoculum and posing difficulties for some resistant varieties. Hence, there should either be a check on introducing new varieties or an evaluation of their performance before introducing them commercially in Bihar. Sugarcane crop stays in the field for 12 months and, when pathogens get favourable conditions, they infect the plant. In order to identify the disease status and susceptibility of different varieties of sugarcane, regular observations and surveys are essential so that, during the period, a proper strategy could be adopted. Most of the diseases associated with sugarcane crop are both soil-borne and sett borne diseases, causing loss of around 15-20 per cent, resulting in reduced yields of the cane crop. In order to prevent such losses, there is a need for a good production program of healthy setts. Sugarcane varieties that show resistance to moderately resistant disease can be considered in the seed production system. Since there could be several sett and soil borne diseases, the setts need to be properly treated with fungicides (carbendazim @ 0.1 per cent) for 20-30 minutes prior to planting but cane farmers do not follow the recommendation properly in Bihar. Thus, it is important to popularize the use of chemical as well as bio-agents for sett treatment in order to achieve optimal results. There are several factors that hinder sugar recovery in sugarcane grown in Bihar. These factors include improper scheduling of harvest, processing of stale and delayed canes, waterlogged soil and delays in harvest and crushing activities. Additionally, lodging of the crop and absence of stress resistant varieties is also among the factors that hinder sugar recovery in Bihar.

Technological Interventions for Improving Productivity of sugarcane in Bihar

Some of the technological innovations that are being used in Bihar for increasing sugarcane production include better varieties, improved planting material, better precision farming practices, integrated nutrient management, and the use of digital agriculture and remote sensing technology. Use of tissue culture cane can result in 40 per cent higher yield than conventional method of using setts. For better planting, 5000 tissue culture plants need to be planted per acre, followed by irrigation immediately after planting. Precision farming is being used by farmers for better cultivation of sugarcane in Bihar. These practices include use of data to overcome problems faced during cultivation such as poor soil quality, insufficient irrigation, and pest's attacks. One company, Farmonaut, offers farmers the use of satellite imagery and soil moisture and temperature information, helping farmers in formulating a better schedule for irrigating their fields to avoid wasting water. Through the use of satellites, boundaries of the farms as well as the growing crops can be observed.

Nutrient management practices play an important role in improving the agronomic efficiency of sugarcane in Bihar. A study conducted on sugarcane fields in Bihar proved that application of Soil Test-Based Recommended Dose of Fertilizer (RDF) along with 25 per cent of nitrogen from press mud and ZnSO4 considerably increased its physio-agronomic efficiency and sugar productivity. RDF method led to a considerable increase in sugar productivity, i.e., by 39.1 per cent in the first year and 38.7 per cent in the second year. Maximum values of agronomic efficiency were observed in tissue culture plantlets and three-budded setts. The recommended fertilizer dose for sugarcane crops grown in Bihar consists of 150:60:40 kg ha-1 of nitrogen, phosphorus, and potassium, respectively. Biological fertilizers such as Azospirillum and Gluconacetobacter diazotrophicus are used to fix atmospheric nitrogen and to solubilize phosphate.

Digital agriculture and remote sensing technologies are changing the way sugarcane farming is done in Bihar by

ensuring that there are real-time data and insights available. The Smart Sugarcane Farming app has been created to provide real-time assistance in managing the crop, preventing diseases, and irrigation management among other things. Remote sensing helps in keeping track of crops and ensuring that any problems such as lack of adequate water and growth are detected promptly. Together with mobile agronomy apps, digital agriculture minimizes the need for field trips and ensures accurate and standardized data, thereby maximizing yields. Digital agriculture and irrigation can play a huge role in enhancing agricultural production and food security through efficient use of water. These technologies can save about 300 billion cubic meters of water annually in India (Dwivedi and Sherly, 2025).

Different Schemes for Sugarcane Development in Bihar

There have been various schemes initiated by the Government of Bihar for the development of the sugarcane industry with the primary objective of providing financial support, facilitating modern techniques, supporting mechanization, and establishing market linkages for sugarcane growers. The primary goals of such schemes include increasing the yield of sugarcane, enhancing income of farmers, reducing cost of cultivation, and developing the sugar and jaggery industry in Bihar. Furthermore, such schemes are also helping to provide employment and boost the rural economy of Bihar.

Some of the key schemes being implemented for the welfare of sugarcane growers are as follows:

1. Scheme for Registration of Sugarcane Growers

This scheme involves the compulsory registration of sugarcane farmers with the department to take advantage of various developments and benefits from the government schemes associated with the production of sugarcane crops.

2. Sugarcane Crop Development Scheme

In an effort to improve the income level of farmers as well as to develop sugarcane crops through improved farming practices, Chief Minister Sugarcane Development Scheme has been introduced.

3. Scheme for Licensing of Jaggery Units

It has been devised to promote the production of jaggery in the state and facilitate improved earnings opportunities for rural communities.

4. Jaggery Unit Scheme

The Chief Minister Jaggery Unit Scheme aims to strengthen the jaggery industry in Bihar by supporting the establishment and modernization of jaggery processing units. The scheme contributes to value addition, income enhancement, and improved economic conditions of producers.

5. Sugarcane Mechanization Scheme

The Chief Minister Sugarcane Mechanization Scheme is initiated to improve the jaggery sector in Bihar by assisting in the setting up and upgrading of facilities for processing of jaggery production. The program helps in adding value to the jaggery product, earnings generation, and improving the financial state of producers.

6. Zonal Development Council (ZDC)

In Bihar, the Zonal Development Council functions under the provisions of the Bihar Sugarcane (Regulation of Supply and Purchase) Act, 1981. The council plays an important role in regulating sugarcane supply and procurement, ensuring coordination between farmers and sugar mills, and supporting regional sugarcane development activities.

Strategic Policy Recommendations

Considering the agro-ecological considerations and production system evaluation, an overall policy strategy is necessary for improving the productivity and sustainability of sugar cane production in Bihar. The proposed policy strategy would focus on improving soil quality through the use of integrated nutrient management, organic carbon, and green manure practices, ensuring healthy and fertile soils. Equally important is improving drainage facilities in the flood-affected and Aquepts areas, coupled with enhancing irrigation facilities to mitigate problems of water logging and drought. The development of high yielding, drought tolerant, and disease-resistant strains that suit the agro-climatic conditions of Bihar should be expedited using advanced breeding technology.

Technical development should become the focal point of this policy with particular focus on the use of precision agriculture technologies, farm mechanization, and decision-support systems using artificial intelligence to provide for effective crop monitoring and management. Also, very crucial in this case would be reforms in institutions, where rejuvenation of sugar mills, payment to farmers on time, and linkage between farmers and industries could be essential for the success of the process. In addition, introduction of crop diversification through practices like inter-cropping, use of bi-products, and other sustainable practices could be advised.

In view of the growing prevalence of diseases such as wilt and red rot, it is essential that the policy should include the introduction of real-time pest and disease surveillance systems in all zones of sugar mills, the use of resistant varieties, and the improved extension service for rapid dissemination of scientific management techniques. In particular, special focus should be placed on climate variability and emerging risks, especially those related to the overlapping effects of pest and diseases, using climate-resilient agricultural practices and advanced technologies like remote sensing and AI-based diagnosis. In addition, there is a need to introduce regional development programs targeting high performing areas based on a cluster-level approach for infrastructure development and extension services. Moreover, public-private partnerships (PPP) for technology transfer, inputs supply, and capacity-building can contribute towards creating an efficient ecosystem.

CONCLUSION

The future of sustainable production of Bihar will depend on the combination of climate tolerant cultivars, efficient water management, quality seeds, mechanization and biological techniques. Increased use of drip irrigation, trash mulching, and bud chip technology would boost their efficiency and productivity. On the other hand, development of value chains of ethanol, bioelectricity, jaggery and other bioproducts will help diversify farmer's income streams.

REFERENCES

Chand H, Kumari R, Minnatullah Md and Paswan S. 2018. Management of borer complex through pheromone traps in sugarcane agro-ecosystem of Bihar. International Journal of Current Microbiology and Applied Sciences SI 7: 158-167.

Dwivedi S and Sherly M A. 2025. Multivariate assessment of digital agriculture and irrigation potential: Application to India. Agricultural Systems 277: 104328. https://doi.org/10.1016/j.agsy.2025.104328

Kumar A, Meena S K, Sinha S K and Singh A K. 2023. Empowering sugarcane production in the Indo-Gangetic Plains: The promise of bio-fertilizers and eco-friendly agriculture. The Science World. https://doi.org/10.5281/zenodo.8247331

Kumar A, Vishwajeet and Singh S N. 2023. Climate change and its impact on sugarcane insect pests of Bihar. In: Kumar N, Singh AK, Kamat DN, Kumar A, Minnatullah Md, Kumar A, Singh SN, Jha CK and Amitabh A (eds). Sustainable Sugarcane Production and Utilization: Issues and Initiatives. SRI, RPCAU, Pusa, Bihar, India, pp 168-176.

Kumar B. 2020. Glimpses of sugarcane varietal screening and improvement at Pusa, Bihar. Acta Scientific Agriculture 4(3): 1-12.

Kumar D, Malik N and Sengar R S. 2021. Physio-biochemical insights into sugarcane genotypes under water stress. Biological Rhythm Research 52(1): 92-115.

Kumar N, Singh H, Kumari R and Singh V P. 2015. Comparative analysis of yield and quality in sugarcane genotypes under waterlogged and normal conditions. The Bioscan 10(4): 1705-1709.

Kumar S and Pareek N. 2024. An in-depth review of climate change impacts studies on sustainable crop production in Bihar, India. Advances in Agricultural Technology and Plant Sciences 7(2): 180125.

Mall A K, Misra V and Pathak A D. 2017. Outcome of climate-change induced drought over sugarcane area, sugar production, sugar recovery and cane crushed in Bihar. Proceedings of NISSTA Annual Convention, ICAR-IISR, Lucknow.

Minnatullah Md, Kamat D N, Singh S P and Kumar B. 2014. Production potential of sugarcane varieties and constraints in Bihar. International Journal of Current Microbiology and Applied Sciences 3(2): 933-939.

Minnatullah Md and Singh S P. 2021. Current situation of sugarcane diseases in Bihar. Agriculture and Food e-Newsletter 3(7): 48-52.

Sanghera G S and Jamwal N S. 2019. Perspective for genetic amelioration of sugarcane towards water logged conditions. Indian Journal of Pure & Applied Biosciences 7(3): 471-477

Sanskriti, Minnatullah Md, Kumar P, Singh S P, Thakur M and Ali M. 2025. Survey on natural incidence across major cane growing belts of Bihar and response of varieties through artificial method against Pokkah Boeng disease. Plant Archives 25(2): 3200-3211.

Sharma M R, Priya S and Kumari S. 2025. Century of rainfall dynamics and drought in Bihar: Patterns, trends and climatic variability. Current World Environment 20(1): 105-120.

Singh A K, Kumar N and Rana L. 2023. Enhancing sugarcane production and productivity in Bihar: Issues and initiatives. In: Kumar N, Singh AK, Kamat DN, Kumar A, Minnatullah Md, Kumar A, Singh SN, Jha CK and Amitabh A (eds). Sustainable Sugarcane Production and Utilization: Issues and Initiatives. SRI, RPCAU, Pusa, Bihar, India, pp 1-10.

Citation: Mall A K, Singh A K, Misra V, Tripathi M K, Tiwari R K and Kumar R. 2026. Sugarcane cultivation in Bihar: Current status, constraints, management strategies, future research opportunities and policy perspectives. Journal of AgriSearch **13** (3) :155-166.