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## Knowledge Level of Improved Cultivation Practices of Sugarcane in Chandel District, Manipur

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### Abstract

The study was conducted in Chandel district state of Manipur, India, under Machi CD blocks in the year 2021. Sugarcane is grown in Manipur for commercial purposes and though farmers of Chandel district is on the forefront, scope for increased production and productivity is still high yet, no major studies have been conducted in the selected district to understand the dynamics of production scenario of sugarcane till the present time of investigation. Therefore, in order to assess the knowledge level of improved cultivation practices of sugarcane, this study was conducted. Sample consists of 104 farmers selected based on Proportionate Random Sampling procedure. The study concluded that 100% (104 nos. of respondents) had knowledge related to propagation, intercultural operation, ratooning and harvesting. More than 90% of the respondents had knowledge regarding soil and varieties. More than half of the respondents had knowledge regarding land preparation, climate, weeding, seed rate and processing and an average knowledge regarding irrigation, insect and pest management and spacing. The findings revealed that the overall Knowledge Index was found to be medium with scores of 63.46%. The study recommends study tours to nearby model farms in the research station or farmers' fields and training programs, off farm and on farm to create awareness about the latest technology to provide first-hand information to the farmers and the extension agent or the related agricultural departments can take up front line demonstration, seminar and workshop which will help farmers to increase their farm output.

**Keywords:** Improved cultivation, knowledge level, knowledge index, sugarcane cultivation, Chandel, Manipur

### 1. Introduction

Sugarcane (*Saccharum officinarum*) is the main source of sugar in India and rank 2nd after Brazil (1<sup>st</sup>) in terms of area and production of sugarcane and sugar (Kumar et al., 2014). The sugar is extracted from the sweet juice of the heart, which contains 14 to 20% of it (Papini-terzi et al., 2009). Sugarcane contributes about 60% of the total world sugar requirement while the remaining 40% come from sugar beet (Dwivedi and Shrivastava, 2021). Production of sugar is the second largest agro-processing industry in the country after cotton and textiles (Verma, 2022). The tropical condition of India is able to provide even sunshine all through the year and well distributed rainfall and ideal conditions for the good growth of the crop leading to high productivity of sugarcane crop (Shanthi and Ramanjaneyulu, 2014). The sugar industry plays an important role in the agricultural economy of India. Today sugarcane cultivation and sugar industry stand as supporting pillars of Indian economy (Chouhan et al., 2013). The industry plays an important role in the Indian economy, accounting for 1% of the national GDP and supporting over 6 million farmers plus numerous workers in harvest, transport, distribution, and wholesale (Solomon, 2016).

The North East India comprises of eight states - Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura with a total geographical area of 262230 km<sup>2</sup> is about 8% of the country's total area. This area is also considered as the native origin of more than 20 major agricultural and horticultural crops and native home of about 160 domesticated species of cultivated crops (Sagolsem et al., 2017). Agriculture is the main occupation of the people of Manipur (Anonymous, 2023). Agriculture sector in Manipur contributes a major share to the total state domestic product and provides employment to about 22.13% (according to 2011 census). Out of the total geographical area of the state, only 7.41% is used for cultivation. Of this total cultivated area, 52% is confined to the valley (Anonymous, 2023).

With the increasing demand for sugar and related products, it has created a need to improve sugarcane productivity in the state to meet the increasing rate of domestic consumption requirement (Shanthi et al., 2021). Although enough viable and adoptive technologies have been developed but many of these have not reached to the ultimate growers and production remains low (Chouhan et al., 2013, Kumar et al., 2014). There may be several reason for this; technological



and social aspects (Chouhan et al., 2013) along with partial adoption of recommended packages of practices (Patel and Vyas, 2014, Prasad et al., 2015). Sugarcane is an important commercial crop of Manipur (Anonymous, 2023).

It is one such crop of which every part of the plant is utilized for industrial production and human/animal consumption (Kumar et al., 2014). Sugarcane also provides raw material for the second largest agro-based industry after textile (Kiruthika, 2014). There are almost no waste products in the production of sugar from sugarcane and the energy consumption is minimal (Varga, 2022). The most important measure introduced recently allows the use of sugarcane juice in ethanol production, in addition to molasses which was permitted previously (Anonymous, 2018). This measure has enabled the sugar industry to divert some sugarcane juice from sugar production to ethanol production. As a result of these measures, the blending rate of ethanol grew to 5.8% in 2019, but ethanol was still largely produced from molasses (Anonymous, 2019).

Based on our informal interviews with farmers and local agricultural experts, it appears that there are several reasons in addition to high returns why farmers prefer sugarcane: sugarcane requires less labour, can be grown in soil with some degree of toxicity, and can withstand longer watering intervals. However, sugarcane's stable high profitability, particularly relative to alternative crops, remains an important incentive for its cultivation (Lee et al., 2020). It is not only the main source of livelihood of the overwhelming majority, but also a tradition and a way of life that moulds the socio-economic status of the people. Sugarcane plays a vital role for the overall socio-economic development of farming community (Rahman and Bee, 2019). Though scope for increased production and productivity is still high, not much research has been done in the study area so far, thus, this research was conducted to understand the knowledge level of selected sugarcane growers in Manipur State, India on improved practices of sugarcane cultivation so that further improvements and recommendations can be made through the scientific study for the benefit of the sugarcane growers.

## 2. Materials and Methods

The study was conducted in Machi block of Chandel District, Manipur state, India; in the year 2021. A total of 6 villages namely Maipou, Minou, Kangshang, Tuinem, Khunbi, Langol were selected purposively. From the selected villages, a total of 104 respondents were selected purposively. Farmers were selected based on Proportionate Random Sampling procedure from 6 villages. Descriptive research design was used for the present study. To study the knowledge level of the respondents, a list of knowledge items was prepared by referring to the package of practices for sugarcane recommended by the Department of Agriculture, Manipur covering 17 aspects

i.e., land preparation, propagation, climate, soil, varieties, planting time, seed treatment, spacing, weeding, seed rate, fertilizers, intercultural operations, irrigation, pest management, harvesting, ratooning and processing.

For calculating Knowledge Index (KI), each practice was framed in a question form to obtain the response from the respondents. The correct answers from the respondents were given „1" point, while wrong answer was given '0'. The following method was adopted to develop knowledge index for measuring the knowledge of the respondents: Knowledge index (KI) = (Total scored obtained) / (Maximum possible score) × 100

## 3. Results and Discussion

### 3.1. Knowledge level of the respondents regarding improved sugarcane cultivation

Based on improved practices recommended by the Directorate of Agriculture, Manipur an interview schedule was elaborated in order to obtain the knowledge level of the respondents

Table 1 revealed that 70.19% of the respondents have knowledge on land preparation, 100% of the respondents

Table 1: Knowledge level of the respondents regarding the land preparation, propagation, climate, soil, varieties and planting time

Sl. No.	Practices	Frequency	Percentage
1.	Land preparation: Deep ploughing 4–6 times followed by two times harrowing to bring the soil to good tilt.	73	70.19
2.	Propagation: Sugarcane is propagated primarily by the planting of cuttings, immature cane used for planting are known as cane setts. Upper 3 parts of sugarcane sett are selected for planting. The selected setts should be healthy and disease free.	104	100
3.	Climate: Sugarcane grows in hot climate	89	85.58
4.	Soil: sugarcane is grown in well drain loamy fertile soil.	94	90.38
5.	Varieties: Early varieties- CO-117 Mature varieties: CO-819, CO-980, CO-62175	96	92.3
6.	Planting time: sugarcane is grown from middle of February to end of March	21	20.19



have knowledge on propagation method of sugarcane, 85.58% of the respondents have knowledge regarding climatic condition and 90.38% of the respondents have knowledge on the soil types. It also revealed that 92.3% of the respondents have knowledge regarding varieties and 20.19% of the respondents have knowledge on planting time of sugarcane.

Table 2 revealed that 100% of the respondents does not have any knowledge on seed treatment, 48% of the respondents have knowledge on spacing and 89.42% of the respondents have knowledge on weeding followed by 80.8% of the

Table 2: Knowledge level of the respondents regarding seed treatment, spacing, weeding, seed rate and fertilizer application

S I . No.	Practices	Fre-quency	Percent-age
1.	Seed treatment: sugarcane sets are soaked in topsin/bavistin @ 5 g 10 l <sup>-1</sup> of water for 30 m.	0	0
2.	Spacing: 40 cm width, 20 cm depth and a spacing of 100 cm.	50	48
3.	Weeding: weeding is done between 15–30 days after showing.	93	89.42
4.	Seed rate: 2500–3000 3 bud sets/ 4–4.5 t are required for 1 ha land	84	80.8
5.	Fertilizer application: N: P: K: @ 350:200:200 kg ha <sup>-1</sup> . 1/3 nitrogen and full dose of phosphorus and potassium is applied at the field before planting of sugarcane. 1/3 quantity of nitrogen is applied 90 days after planting and remaining 1/3 of nitrogen is applied 120 days after planting.	30	28.84

respondents have knowledge on seed rate and 28.84% of the respondents have knowledge on fertilizer application.

Table 3 revealed that 100% of the respondents have good knowledge on intercultural operations such as earthing up, tying up of old leaves in sugarcane, 46.15% of the respondents have knowledge on irrigation, 38.5% of the respondents have knowledge on insects pest management It also reveals that 100% of the respondents have knowledge regarding harvesting and ratoon cropping on sugarcane and 85.6% of the respondents have knowledge on processing of sugarcane.

Table 4 shows the overall knowledge level of the respondents in the study area. It revealed that majority of the respondents with 63.46 falls under medium knowledge level followed by high knowledge level with 23.08% and 13.46% low knowledge level.

Table 3: Knowledge level of the respondents regarding intercultural operation, irrigation, insect-pests management, harvesting, rationing and processing

S I . No.	Practices	Fre-quency	Percent-age
1.	Intercultural operations: a) Earthing up is done before the onset of monsoon during May, beginning of June and ending of June b) Tying up of old leaves of sugarcane is done along with earthing up of sugarcane	104	100
2.	Irrigation: Irrigation should be given between middle of February to ending of March and also given after harvesting so that new shoots will come out soon.	48	46.15
3.	Insect and pest management: a) Borer and shoot borer can be control by collecting and destroying the eggs. b) Termites, leaf hoppers, whitefly sugarcane scale and mealy bug can be control by Furadon 3G @ 10–20 kg and Diazinol 10G @ 10 kg ha <sup>-1</sup> or BGH 10 @ 30–35 kg ha <sup>-1</sup> by applying two times between the month of April and June. c) Willy aphid can be control by spraying Quinalphos or Endosalphan 35 E.C. @ 1 L 500 L <sup>-1</sup> of water ha <sup>-1</sup> and spray in between the month of July and August.	40	38.5
4.	Harvesting: When setts becomes shinny in appearance and leaves started to wither harvesting can be done.	104	100
5.	Ratoon: Sugarcane can continue to grow by the process called ratoon cropping by cutting the above ground portion but leaving part of cane underground after harvesting which gives rise to new crops.	104	100
6.	Processing: processing of sugarcane juice into molasses and Gur.	89	85.6

Table 4: Distribution of respondents based on their overall knowledge level

Sl. No.	Category of knowledge	Frequency	Percentage	Mean	SD
1.	Low ( $\leq 10.64$ )	14	13.46	12.75	2.11
2.	Medium (10.64–14.87)	66	63.46		
3.	High ( $\geq 14.87$ )	24	23.08		

#### 4. Conclusion

All the respondents had adequate knowledge on recommended practices of propagation and its importance, earthing up, tying up, harvesting and rationing of the sugarcane, while, more than half of the respondents had good knowledge on land preparation, propagation, climate, soil, varieties, spacing, weeding, seedrate and processing. The knowledge gap on recommended practices were more on planting time and fertilizer application and none of the respondents knew about seed treatment.

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