

# **Assessment of Mechanization Index of Sugarcane Cultivation in Mandya District, Karnataka, India**

## **Abstract**

Farm mechanization is the development and introduction of mechanized assistance of all forms and at any level of sophistication in agricultural production to improve the efficiency of human time and labour. Mandya District is one of the most agriculturally prosperous districts in Karnataka. Sugarcane is the major commercial crop in the district. Farmers used to grow in all seasons. This study was carried out to assess the mechanization index in sugarcane cultivation in selected regions. Respondents from the selected region were selected randomly and collected information regarding types of machinery availability and usage in sugarcane cultivation. The overall mechanization index found 50.5 per cent in sugarcane cultivation in selected regions. The findings indicate that the process of laying seed beds had the highest mechanisation index (98.46 per cent), followed by irrigation (97.37 per cent) and weeding/spraying operations (57.81 per cent). Semi medium farmers found high mechanization index followed by medium, small and marginal farmers. The mechanization index was not uniform in selected region for all operations in sugarcane cultivation. Seedbed preparation found higher mechanization index followed by irrigation and weeding operation and zero per cent mechanization index for planting and harvesting operations of sugarcane. The results clearly depicted the importance of the farm mechanization in realizing additional profit to the farmers.

**Keywords:** Sugarcane, Farm mechanization, Mandya, Karnataka, Mechanization index

## **1. Introduction**

Agricultural mechanization is enabled by technologies that create value in agricultural production practices through the more efficient use of labour, the timeliness of operations, and more efficient input management with a focus on sustainable, high-productivity systems (Reid, 2011) and (Shwetha *et al* 2021).

Mandya District is one of the most agriculturally prosperous districts in Karnataka. With the advent of irrigation from the K.R. Sagar reservoir (During the 1930s), there was a substantially marked transformation in cropping pattern, the composition of crops, better growth yield level, ultimately leading to better economic conditions for the people (Anonymous, 2016)

The total geographical area of the district is 4,98,244 ha, out of which 2,48,825 ha forms the cultivated area. More than half of the total land area in the district is put to agricultural use. The total irrigated area is 1,16,901ha out of which around 88,000 ha is being irrigated by K.R.Sagar and around 16,000 ha by Hemavathi reservoir. The rest of the land is irrigated by other sources like tanks, wells and bore wells (Anonymous,2016).

Agriculture is the main activity in the district. The major crops of the district are sugarcane, ragi, rice, pulses and oilseeds. Sugarcane is the major commercial crop in the district. Farmers used to grow in all seasons. In the kharif season, farmers cultivate sugarcane around 31800 ha with a production of 35,24,500 tonnes and a productivity rate of 111 tons/ha and also in the rabi/summer season cultivate around 4860ha with a production of 5,34,600 tons and a productivity rate of 111ton/ha(Anonymous,2016).

Mechanization may be defined as the process of injecting power and machinery between man and materials in a production system (Khalequzzaman and Karim, 2007). Verma (2008) reported that agricultural mechanization implies the use of various power sources and improved farm tools and equipment, with a view to reduce the drudgery of human beings and draught animals, enhance the cropping intensity, precision and timelines of efficient utilisation of various crop inputs and reduce the losses at different stages of crop production. Starkey (1998) defined farm mechanization as the development and introduction of mechanized assistance of all forms and at any level of sophistication in agricultural production to improve the efficiency of human time and labour.

Joppich (1957) in his study reported that mechanization affects the cost structure of agricultural production by (i) Saving labour (manual and bullock) (ii) Easing jobs (iii) Increasing yield and (iv) Facilitating the opening up of new land. The problem of labour shortage put the farmers to increased use of machine power in operations like field preparation, harvesting, winnowing and transportation. The use of efficient machines in agricultural mechanization improves the utilization efficiency of inputs like fertilizers and agrochemicals and reduces the negative impact on the environment (Anonymous, 2015). In India, farm mechanization is growing at less than five per cent in the last two decades. Achieving/ attaining of the government's target of doubling farmers' income in upcoming years is possible through large-scale mechanization as it will bring down the cost of cultivation (Mishra, 2007). Further, the use of agri-machineries will help increase production by 20 per cent and bring down the cost of cultivation by 20-25 per cent. Farm mechanization

is key for modernizing the agriculture sector. With this background, this study mainly focused on assessing the mechanization index in sugarcane cultivation in Mandya district, Southern Dry Zones of Karnataka

## **2. Methodology**

Based on the population of farmers, samples of 50 farmer respondents from the Thaggahalli village in Mandya district were selected randomly. Thaggahalli is one of the major sugarcane production villages in Mandya district. Respondents were categorised into marginal, small, semi-medium, medium and medium farmers based on land holdings. General information regarding the use of different types of machinery and types of equipment, cultivable land availability, different farm operations they followed to cultivate sugarcane, labours and time consumed for different operations, machines used, energy/fuel/power required for different operations, costs and returns of different crops and also the relevant data on variables related to the study etc., were collected from the sample respondents. The data collected were purely based on the memory of the respondents. Therefore, the sample respondents were convinced genuinely about the purpose for which the data was collected at the time of the interview in order to minimize personal bias.

### **a. Mechanization Index**

The mechanization index was calculated by following the formula

$$\text{Mechanization Index} = \frac{MP}{MP+Ap+HP} \times 100$$

Where,

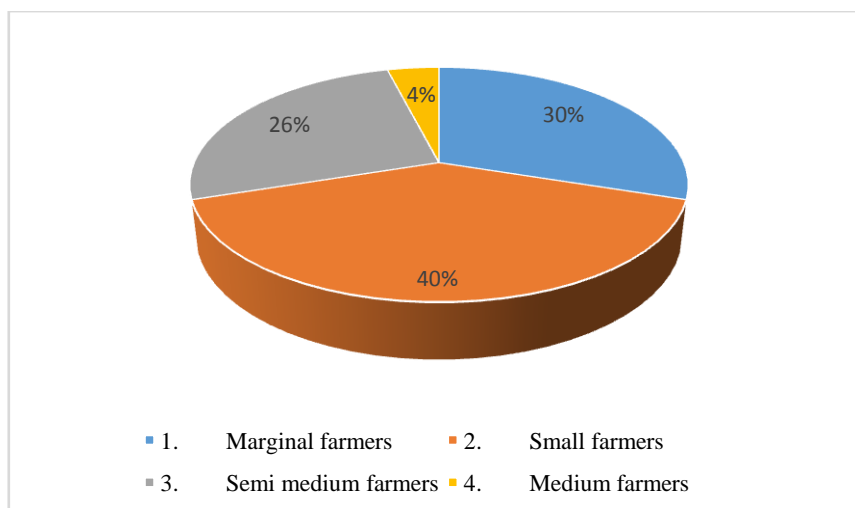
MP - Mechanical power

AP – Animal Power

HP – Human Power

## **3. Results and Discussion**

The respondents were categorised into marginal (< 1ha), small (1-2 ha), semi medium (2-4 ha), medium (4-10ha) and large farmers (>10 ha) based on land holdings. There were 30 per cent of marginal farmers, 40 per cent of small farmers, 26 per cent of semi-medium farmers and 4 per cent of medium farmers present in the selected region.



**Fig .1. Type of farmers based on land holdings**

### **3.1 Mechanization index in sugarcane cultivation based on type of farmers**

The mechanization index in sugarcane cultivation in the selected region based on the type of farmers is shown in Table 1. The total mechanization in sugarcane cultivation in the selected region was about 50.5 per cent. The mechanization index was high in semi-medium farmers followed by medium, small and marginal farmers. The mechanization index in sugarcane cultivation of semi-medium farmers was about 51.85 per cent, for medium farmers it was about 50.62 per cent, for small farmers 50.19 per cent and for marginal farmers it was about 49.34 percent.

The results show the mechanization index of marginal farmers in sugarcane cultivation was minimal in selected regions, this may be due to small land holdings farmers preferring animal and human labours rather than mechanical power.

**Table 1: Mechanization index in sugarcane cultivation based on type of farmers**

<b>Sl.no</b>	<b>Type of farmers</b>	<b>Mechanization index, %</b>
1.	Marginal farmers	49.34
2.	Small farmers	50.19
3.	Semi medium farmers	51.85
4.	Medium farmers	50.62
5.	Large farmers	-
	<b>Total</b>	<b>50.5</b>

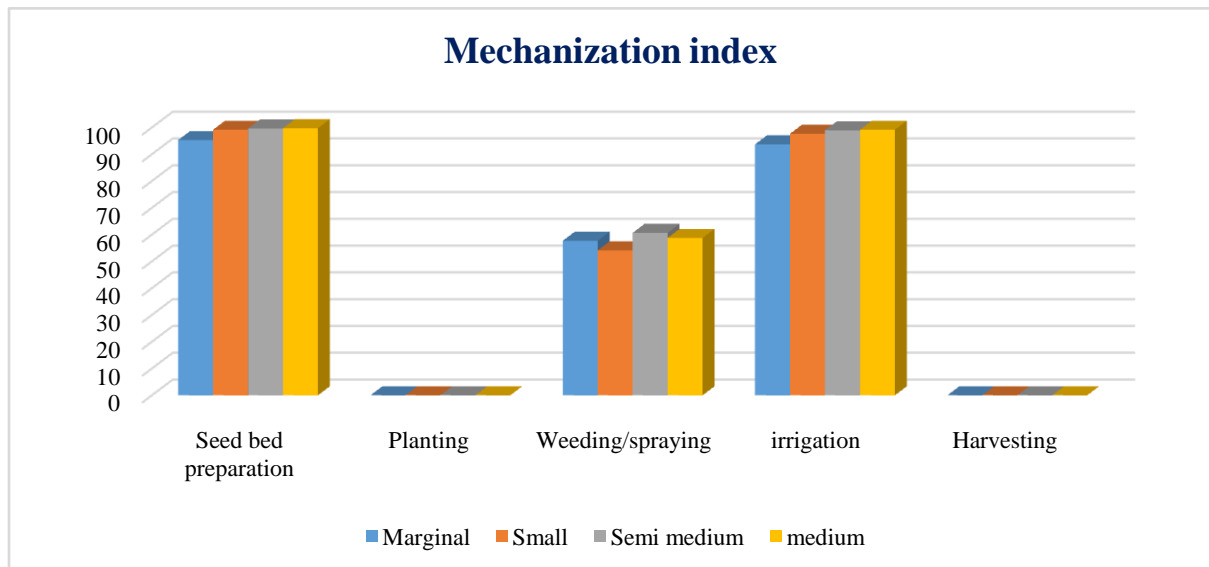
### **3.2. Mechanization index in sugarcane cultivation based on type of operation**

The mechanization index based on the operation in sugarcane cultivation of all types of farmers is shown in Table 2. The results show that the mechanization index was high in seedbed preparation (98.46 per cent) followed by irrigation (97.37 per cent) and

weeding/spraying operation (57.81 per cent) Fig.2. The mechanization index was zero for planting and harvesting operations since the majority of farmers were performing operation manually and also unaware and unavailability of equipments for the particular operation.

**Table 2: Mechanization index in sugarcane cultivation based on operation**

Sl.no	Type of farmers	Seedbed preparation	Planting	Weeding/spraying	irrigation	Harvesting	Total
1.	Marginal	95.3	-	57.69	93.7	-	49.338
2.	Small	99.16	-	54.102	97.665	-	50.1854
3.	Semi medium	99.64	-	60.66	98.94	-	51.85
4.	medium	99.725	-	58.76	99.15	-	50.62
5.	Large	-	-	-	-	-	-
	Total	98.46	-	57.81	97.37	-	50.5



**Fig.2. Mechanization index in sugarcane cultivation based on operation**

#### 4. Conclusion

Farm mechanization helps in the timely performing of operations in the field. Seedbed preparation had a high level of mechanization followed by irrigation and weeding operations compared to planting and harvesting had zero mechanization index. Deficit or non-availability of sufficient farm machinery/implements with the farmers was observed. Therefore, to enhance the mechanization level in the study areas, the Government should create awareness among the farmers about the existence of custom hiring centres and

adequate measures should be taken to promote mechanization by providing financial incentives to the farmers for the purchase of specialized machinery (planters, harvesters *etc.*).

## 5. References

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