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Level of use of sugarcane cultivation practices by farmers in Sindhudurg district

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Abstract

The present study explored level of use of improved sugarcane cultivation practices by farmers in Sindhudurg district. For the study Sindhudurg district were purposively selected from Konkan region of Maharashtra state. Two talukas viz., Vaibhavwadi and Kankavli from Sindhudurg district were selected purposively based on maximum area under sugarcane cultivation and five villages from each taluka were selected. From each village twelve respondents were selected randomly. The constituting total sample size is 120. The Ex-post-facto research design was used for the study. A well-structured questionnaire designed for study was used for collecting the data from respondents through personal interview method. The data collections from the respondents were edited tabulated and analyzed using suitable statistical tools like frequency, percentage, mean, standard deviation, chi-square and Kendall's coefficient of concordance. The study noticed that, Level of use of the farmers concluded from the present study that majorities of respondents were having 'full' level of use of the practices namely, 'ploughing at 25 to 30 cm depth' (100.00 percent), 'two to three harrowing' (53.33 percent), planting in 'January-February (suru)' (100.00 percent), 'ridge and furrow method of sugarcane planting' (100.00 percent), Planting type 'dry planting' (56.67 percent), use of 'CO-92005' variety (100.00 percent), '35,000-38,000 of sets/ha' (60.00 percent), number of eye bud selected '2 eye bud' (45.00 percent), 'age of selected sets- 10 to 12 months' (100.00 percent), spacing '22.7 cm between 2 sets × 90 cm between 2 rows' (66.67 percent), seed treatment 'Chemical treatment – Bavistin 0.1% @ 10 g/10L of water' (55.83 percent), weed management 'two to three hand weeding with the help of sickle' (100.00 percent), earthing up operation '90 to 120 days after planting' (100.00 percent), application of fertilizer dose of 'suru-250:115:115 kg/ha NPK' (100.00 percent), 'at the time of planting 10% NPK (70.83)', 'first top dressing 6 weeks after planting, 20% NPK' (74.17 percent), 'second top dressing 10 weeks after planting, 30% NPK' (91.66 percent), 'third top dressing 14 weeks after planting, 40% NPK' (87.50 percent), 'broadcasting' of fertilizer, (72.50 percent), 'application of micronutrients 25Kg/ha FeSO₄, 20 Kg/ha ZnSO₄, 10Kg/ha MnSO₄, 5Kg/ha Borax' (69.17 percent), 'surface irrigation method of irrigation' (89.17 percent), 'interval between two irrigations, 8 to 10 days during summer' (100.00 percent), application of 'Chlorpyrifos (20 EC) 15ml in 10 litres of water for woolly aphid' (50.84 percent), 'application of lindane (6%) granules 16.6 Kg/ ha' (53.34), application of 'Phorate (10G) 25 kg/ha respectively, for control of white grub' (79.17 percent), 'metallic sound as maturity sign of sugarcane' (100.00 percent), harvesting time of sugarcane for 'suru-12 to 13 months' (100.00 percent).

Keywords: Sugarcane, existing practices, level of use

Introduction

Sugarcane is a major commercial crop grown in over 75 countries, with India, Brazil, Cuba, Mexico, and Thailand leading the way. After Brazil, India is the world's largest consumer and the second-largest producer of sugarcane. Farmers highly value the crop as a commercial commodity and for its simplicity of growing. The sugar industry is in charge of supplying sugar, which is considered an essential component of the human diet and can be found in a variety of staple meals depending on geography. It is used in practically every culinary product. Sugar production in the world is currently at 180 million metric tons per year.

Sugarcane belongs to the Gramineae family and the genus *Saccharum officinarum*. The genus *Saccharum* consists mostly of five species, three of which are cultivated and two of which are wild. The sugarcane crop originated in New Guinea and eventually expanded to numerous places throughout the world. Sugarcane growing employs over 50 million farmers and millions more laborers in India. After cotton, the sugarcane and sugar sector in India ranks second among the country's agro-based industries. In terms of sugar output, India leads the world. In 2022, it is expected to generate approximately 37 million metric tons of sugar. It not only provides a living for sugarcane growers in rural areas, but also employs approximately 5 lakh people in the sugar mills.

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Sugarcane is a most important cash crop; it involves less risk and farmers are assured up to some extent about return even in adverse condition. Sugarcane provides raw material for the second largest agro-based industry after textile. The sugar industry is an instrumental in generating the sizable employment in the rural sector directly and through its ancillary units. It is estimated that about 50 million farmers and their dependents are engaged in the cultivation of sugarcane and about 0.5 million skilled and unskilled workers are engaged in sugar factories and its allied industries. The sugar industry in India has been a focal point for socio-economic development in the rural areas by mobilizing rural resources, generating employment and enhancing farm income.

The increased production of sugarcane by way of adoption of new technologies necessitated modernization of sugar industry, thereby, boosting the general economy of the country. The modernized sugar industries can crush any quantity of cane and to produce sugar products. This resulted into increasing demand for sugarcane. Thus, a major breakthrough in sugarcane production in India need to be accomplished with the knowledge of the present package of practices that are recommended by the concerned sugarcane research institutes and the varieties plus other inputs used by the sugarcane growers in the cultivation of sugarcane.

Sugarcane crop is one of the major cash crops in Sindhudurg district of the Maharashtra. Due to various schemes and programmes launched by the government and sugar factory the area, production and productivity of sugarcane has increased remarkably during last ten years. However, the earnings from the sugarcane depend upon its efficient knowledge given through training and level of use of improved sugarcane cultivation practices.

Materials and Methods

The present study was carried out in Konkan region of Maharashtra State during the year 2022-23. The present investigation was carried out in Konkan region for the study one district is selected purposively, i.e. Sindhudurg. In Sindhudurg district two talukas were selected purposively i.e. Vaibhavwadi and Kankavli based on maximum area under

sugarcane cultivation. In selected talukas five villages were selected, thus total ten villages were selected for the present investigation. From each selected village, twelve (12) farmers were selected randomly. That farmer who are engaged in sugarcane cultivation was selected as a respondent. Thus, 120 total respondents for the present study. An interview schedule was prepared, so as to collect the information in line with the objectives of the study. Personal interview technique was used for data collection. The ex-post-facto research design was used for the present study. The data collected from the selected respondent during the course of investigation was entered and tabulated in the excel worksheet and then appropriate analysis of data was made according to objectives formulated for study. Further, the statically techniques were applied to analyze tabulated data and interpreted it to reach up to the findings. Statistical methods to be used viz. mean, standard deviation, Chi-square test, Kendell's coefficient of concordance, frequency and percentage.

Results and Discussion

Level of use of Sugarcane cultivation practices followed by farmers

The identification of the cultivation practices followed by sugarcane growers were taken into consideration to know the level of use of improved practices by the farmers.

Table 1: Distribution of respondents according to overall level of use of existing cultivation practices

Sr. No.	Level of use (score)	Respondents (N=120)	
		Frequency	Percentage
1.	Low (Up to 42)	22	18.33
2.	Medium (43 to 63)	73	60.83
3.	High (64 and above)	25	20.83
Total		120	100.00

It was observed that, majority 60.83 percent of the sugarcane growers had medium level of use of existing practices, followed by 20.83 percent of the sugarcane growers had high and 18.33 percent of the sugarcane growers had low level of use of existing practices, respectively.

Table 2: Distribution of the sugarcane growers according to their level of use of sugarcane practices

Sr. No.	Existing Practices	Level of use	
		Full	No
A	Preparatory tillage		
1.	Ploughing at 25-30cm depth	120 (100.00)	-
2.	2-3 harrowing	64 (53.33)	56 (46.67)
B	Sugarcane planting season		
1.	Adsali (July-Aug)	-	120 (100.00)
2.	Suru (Jan-Feb)	120 (100.00)	-
3.	Pre seasonal planting (Oct- Nov)	-	120 (100.00)
C	Planting methods		
1.	Ridges and furrow	120 (100.00)	-
2.	Patta method	-	120 (100.00)
D	Planting type		
1.	Dry planting (without irrigation)	68 (56.67)	52 (43.33)
2.	Wet planting (with irrigation)	52 (43.33)	68 (56.67)
E	Use of varieties		
1.	Co-86032	-	120 (100.00)
2.	Co-94012	-	120 (100.00)
3.	Co-92005	120 (100.00)	-
F	Seed rate per hectare		
1.	35,000 to 38,000 of sets/ha	72 (60.00)	48 (40.00)
2.	25,000 to 30,000 sets/ha	48 (40.00)	72 (60.00)

G.	Number of eye bud on selected set		
1.	1 eye bud	24 (20.00)	96 (80.00)
2.	2 eye bud	54 (45.00)	66 (55.00)
3.	3 eye bud	42 (35.00)	78 (65.00)
H.	Age of selected sets		
1.	10-12 months	120 (100.00)	-
I.	Spacing		
1.	22.7 cm between 2 sets × 90 cm between 2 rows	80 (66.67)	40 (33.33)
J.	Seed Treatment		
1.	Biological treatment – azitobacter/azotobacter @10 Kg/100 litres of water	22 (18.33)	98 (81.67)
2.	Chemical treatment – Bavistin 0.1% @10g/10L of water	67 (55.83)	53 (44.17)
3.	Hot water treatment - 52 ^o C for 10-15 min	-	120 (100.00)
K.	Weed management		
1.	Two to three hand weeding with the help of sickle	120 (100.00)	-
L.	Use of weedicide		
1.	Spray the soil 2-3 days after planting with Atrazine (Atratap) @5Kg/ha in 1000 L of waters	47 (39.16)	73 (60.84)
2.	Metribuzin (Sencor) @1.25 Kg/ha in 1000 L of water	47 (39.16)	73 (60.84)
3.	Spray the soil with 2,4-D @1.25Kg/ha in 500L of water	49 (40.34)	71 (59.16)
M.	Earthing up operation		
1.	At 90-120 DAP	120 (100.00)	-
N.	Fertilizer management		
1.	Green manuring	52 (43.33)	68 (56.67)
2.	FYM / compost 15-25 tonnes/ha	51 (42.50)	69 (57.50)
O.	Application of organic manure		
1.	At the time of ploughing	51 (42.50)	69 (57.50)
2.	At the time of planting	50 (41.67)	70 (58.33)
P.	Application of chemical fertilizers		
1.	Suru – 250:115:115 NPK Kg/ha	120 (100.00)	-
2.	Pre seasonal plantation – 340:170:170 NPK Kg/ha	-	120 (100.00)
Q.	Time of application of fertilizer		
1.	At the time of planting 10% NPK	85 (70.83)	35 (29.17)
2.	First top dressing 6 weeks after planting, 20% NPK	89 (74.17)	31 (25.83)
3.	Second top dressing 10 week after planting, 30% NPK	110 (91.66)	10 (8.34)
4.	Third top dressing 14 weeks after planting, 40%NPK	105 (87.50)	15 (12.50)
R.	Method of application of fertilizer		
1.	Broadcasting	87 (72.50)	-
2.	Side dressing	33 (27.50)	-
3.	Foliar application	-	120 (100.00)
4.	Dibbling with the help of crowbar for ratooning	65 (54.17)	55 (45.83)
S.	Application of micronutrients		
1.	25Kg/ha FeSO ₄ , 20 Kg/ha ZnSO ₄ , 10Kg/ha MnSO ₄ , 5Kg/ha Borax	83 (69.17)	37 (30.83)
T.	Irrigation management		
1.	Surface irrigation	107 (89.17)	13 (10.83)
2.	Sprinkler irrigation	-	120 (100.00)
3.	Drip irrigation	13 (10.83)	107 (89.17)
U.	Interval between 2 irrigations		
1.	Summer – 8-10 days interval	120 (100.00)	-
2.	Winter – 12-15 days interval	99 (82.50)	21 (17.50)
V.	Diseases and pest management		
1.	Woolly aphid – Spraying with Chlorpyriphos (20 EC) 15ml in 10 litres of water	61 (50.84)	59 (49.16)
W.	Sugarcane stem borer		
1.	Early sowing of sugarcane	59 (49.16)	61 (50.84)
2.	Use of Trichogramma card	-	120 (100.00)
3.	Application of lindane (6%) granules 16.6 Kg/ ha	64 (53.34)	56 (46.66)
4.	White grub –Application of phorate (10 g) 25Kg/ha	95 (79.17)	25 (20.83)
X.	Grassy shoot of Sugarcane		
1.	Seed treatment with Streptocyclin 10g in 100 L of water	41 (34.16)	79 (65.84)
2.	Whip smut – Seed treatment with Bavistin 0.1% (10g in 100 L of water)	32 (26.67)	88 (73.33)
Y.	Harvesting of sugarcane		
1.	Brix saccharometer reading in between 21-24	42 (35.00)	78 (65.00)
2.	Metallic sound of sugarcane	120 (100.00)	-
Z.	Harvesting time of sugarcane		
1.	Suru-12 to 13 months	120 (100.00)	-
2.	Preseason plantation- 15 months	-	120 (100.00)

Figures in parenthesis indicate percentage (%)

1. Preparatory tillage

The data reported in Table 2 revealed that in case of preparatory tillage 100.00 percent respondents had full level of use of the practice ploughing at 25 to 30 cm depth, while in case of two to three harrowing majority 53.33 percent of the respondents had full level of use, whereas 46.67 percent of the respondents did not use the practice.

From these observations, it can be said that the sugarcane growers had full level of use of those practices, which were within their reach and no level of use those which were beyond their reach.

2. Sugarcane planting season

The data reported in Table 2 revealed that cent percent of the respondents had no level of use about the adsali (July-August) sugarcane plantation, while the 100.00 percent of the respondents had full level of use suru (January-February) sugarcane planting season, whereas no level of use of pre-seasonal (October-November) planting season.

From these observations, it can be said that cent percent of the respondents have no level of use of adsali as sugarcane planting season. It is quite obvious as far as Konkan is concerned wherein, July-August is the peak monsoon period. Majority of the respondents had full level of use of suru as sugarcane planting season.

3 Planting method

The data reported in Table 2 revealed that 100.00 percent of the respondents had full level of use of the ridges and furrow method of sugarcane planting, while 100.00 percent of the respondents had no level of use of the *patta* method of sugarcane planting.

From these observations, it can be said that cent percent of the respondents had full level of use of ridge and furrow method of sugarcane planting and no level of use of *patta* method of sugarcane planting because, they were not aware about it.

4 Sugarcane planting type

The data reported in Table 2 revealed that maximum 56.67 percent number of the respondents had full level of use, followed by 43.33 percent of the respondents had full level of use of the wet planting of sugarcane practice.

This means that according to situation both dry and wet planting methods were followed by them.

5 Recommended varieties

The data reported in Table 2 revealed that cent percent of the respondents had full level of use of recommended variety CO-92005. It also shows that there was no level of use of CO-94012 and CO- 86032 as recommended variety.

Thus, it can be said that CO-92005 was the preferred sugarcane variety, as the same has been traditionally grown in the area and also recommended by sugarcane factory for use.

6 Seed rate

The data reported in Table 2 revealed that 60.00 percent of the respondents had full level of use of the seed rate 35,000 to 38,000 sets/ha and 40.00 percent of the respondents had full level of use of the seed rate 25,000 to 30,000 sets/ha.

7 Number of eye bud on selected set

The data reported in Table 2 revealed that with regards of selection of number of eye bud, it was observed that maximum 45.00 percent number of the respondents had full

level of use of two eye budded set, followed by 35.00 percent of the respondents had full level of use three eye budded set and 20.00 percent of the respondents had full level of use of the one eye budded set. By and large the sugarcane growers were using 2 to 3 eye budded set.

8 Age of selected sets

The data reported in Table 2 revealed that all the respondents 100.00 percent had full level of use of the 10 to 12 months old age sugarcane sets for planting.

Thus, it can be said that the respondents were following proper age of set for planting.

9 Recommended Spacing

The data reported in Table 2 revealed that majority 66.67 percent of the respondents had full level of use of the recommended spacing as 22.7 cm between two sets and 90 cm between two rows, while 33.33 percent of the respondents had no level of use of the given spacing.

10 Seed treatment

In case of seed treatment, it was observed that majority 81.67 percent of the respondents had no level of use, while 18.33 percent of the respondents had full level of use of the Biological treatment- Azotobacter 10 kg/100 lit. of water, whereas maximum number 55.83 percent of the respondents had full level of use, and 44.17 percent of respondents had no level of use of Chemical treatment- Bavistin 0.1% (10 gm/10 lit. of water). While the cent percent respondents had no level of use of hot water treatment- 52°C for 10-15 minutes.

At overall level it can be said that seed treatment was not much used by the respondents and there is need to train the sugarcane growers in this aspect.

11 Weed Management

It is evident from Table 2 that all the respondents had full 100.00 percent level of use of two to three hand weeding with help of sickle. Whereas, 40.34 percent of the respondents had full level of use of spray the soil with 2-4-D 1.25 kg/ha in 500 litres of water, followed by 39.16 percent of the respondents had full level of use of the spray the soil 2-3 days after planting with Atrazine (Atratap) 5 kg/ha in 1000 litres of water and Metribuzin (Sencor) 1.25 kg/ha in 1000 litres of water, respectively.

Except hand weeding, the other practices of weed management had less level of use by majority of the sugarcane growers possibly because of lack of knowledge and non-availability of improved implements and high cost of weedicide.

12 Earthing up operation

It was evident from Table 2 that, 100.00 percent of the respondents had full level of use of the earthing up operation 90-120 days after planting. From these observations, it can be said that all of the sugarcane growers used the earthing up operation in time.

13 Fertilizer Management

The data reported in Table 2 that shows that, only 43.33 percent and 42.50 percent of the respondents had full level of use of green manuring in sugarcane and use of 15-25 tonne/ha FYM/compost, respectively. In case of application of organic manure 42.50 percent and 41.67 percent of the respondents had full level of use of the practice of application of organic

manure at the time of ploughing and at the time of planting respectively.

With regards of application of chemical fertilizers dose, all 100.00 percent the respondents had full level of use of the dose recommended for suru-250:115:115 NPK kg/ha and had no level of use of dose recommended for Preseasonal plantation-340:170:170 NPK kg/ha. Maximum number 70.83 percent of the respondent had full level of use application of fertilizer at the time of planting 10% NPK, while 74.17 percent of the respondents had full level of use of first top dressing 6 weeks after planting, 20% NPK, followed by 91.66 percent of the respondents had full level of use of second top dressing 10 weeks after planting, 30% NPK and 87.50 percent had full level of use third top dressing 14 weeks after planting, 40% NPK.

With regards of method of application of fertilizers, it was observed that 72.50 percent of the respondents had full level of use of broadcasting and 27.50 percent use side dressing while cent percent 100.00 percent of the respondents had no level of use of foliar application of fertilizer. Whereas, 54.17 percent of the respondents had full level of use of fertilizer application method dibbling with the help of crow bar for ratooning.

In case of application of micronutrient, 69.17 percent of the respondents had full level of use of application of 25 kg/ha Ferrous sulphate, 20 kg/ha Zinc sulphate, 10 kg/ha Manganese sulphate and 5 kg/ha Borax respectively, while 30.83 percent of the respondents had no level of use of micronutrient application.

Thus, it can be said that considerable number of respondents were following fertilizer management practices to the good level.

14 Irrigation Management

It was evident from Table 2 that, majority 89.17 percent of the respondents had full level of use of surface irrigation method of irrigation, while 10.83 percent of the respondents had no level of use of given method. Whereas 100.00 percent of the respondents had no level of use of sprinkler irrigation method. Majority 89.17 percent of the respondents had no level of use of drip irrigation, while 10.83 percent of the respondents had full level of use of given method of irrigation.

Regarding irrigation interval, 100.00 percent of the respondents had full level of use of irrigation in summer- 8 to 10 days interval, followed by 82.50 percent of the respondents had full level of use of irrigation in winter- 12 to 15 days interval and 17.50 percent of the respondents had no level of use of given irrigation interval.

This means that modern irrigation methods like sprinkler and drip had no level of use on large scale.

15 Disease and Pest Management

The data reported in Table 2 revealed that, 50.84 percent of the respondents had full level of use of spraying with Chlorpyrifos (20 EC) 15 ml in 10 litres of water for control of woolly aphid, while 49.16 percent of the respondents had no level of use of the given practice, respectively. However, for controlling of the sugarcane stem borer, 50.84 percent of the respondents had no level of use of early sowing of sugarcane, whereas, cent percent 100.00 percent of the respondents had no level of use of use of Trichogramma card. Maximum number 53.34 percent of the respondents had full level use of application of Linden (6%) granule 16.6 kg/ha, while 46.66 percent of the respondents had no level of use of

the given practice, respectively. Majority 79.17 percent of the respondents had full level of use application of Phorate (10G) 25 kg/ha for control of white grub, followed by 20.83 percent of the respondents had no level of use of given practice. In all 34.17 percent of the respondents had full level of use of seed treatment with Streptocycline 10gm in 100 litres of water for control of grassy shoot of sugarcane, while 65.83 percent of the respondents had no level of use of the given practice. Majority 73.33 percent of the respondents had no level of use of seed treatment with Bavistin 0.1% (10 gm in 100 lit. water) for control of whip smut, while 26.67 percent of the respondents had full level of use of the given practice. Thus, it can be said that practices for disease and pest management were not much used by the respondents to the desired extent.

16 Harvesting of sugarcane

The data reported in Table 2 revealed that, majority 65.00 percent of the respondents had no level of use of Brix saccharometer reading in between 21 to 24 for testing the maturity of sugarcane, while 35.00 percent of the respondents had full level of use of the given practice. Whereas, 100.00 percent of the respondents had full level of use of Metallic sound of sugarcane for testing maturity.

With respect to harvesting time, cent percent respondents had full level of use of harvesting time of Suru- 12 to 13 months, followed by no level of use of harvesting time pre-seasonal plantation- 15 months, respectively.

It may be attributed to the calendar of operation decided by the factory and availability of skilled labour and other facility during harvesting.

Conclusion

The study provides us level of use of sugarcane cultivation practices. The data regarding practice-wise level of use revealed that, majority of the respondents had full level of use of the practices namely, ploughing at 25 to 30 cm depth 100.00 percent, two to three harrowing 53.33 percent, planting in January-February (suru) 100.00 percent, ridge and furrow method of sugarcane planting 100.00 percent, Planting type dry planting 56.67 percent, use of CO-92005 variety 100.00 percent, 35,000-38,000 of sets/ha 60.00 percent, number of eye bud selected 2 eye bud 45.00 percent, age of selected sets- 10 to 12 months 100.00 percent, spacing 22.7 cm between 2 sets × 90 cm between 2 rows 66.67 percent, seed treatment Chemical treatment – Bavistin 0.1% @10g/10L of water 55.83 percent, weed management two to three hand weeding with the help of sickle 100.00 percent, earthing up operation 90 to 120 days after planting 100.00 percent, application of fertilizer dose of suru-250:115:115 kg/ha NPK 100.00 percent, at the time of planting 10% NPK 70.83 percent, first top dressing 6 weeks after planting, 20% NPK 74.17 percent, second top dressing 10 weeks after planting, 30% NPK 91.66 percent, third top dressing 14 weeks after planting, 40% NPK 87.50 percent, broadcasting of fertilizer, 72.50 percent, application of micronutrients 25Kg/ha FeSO₄, 20 Kg/ha ZnSO₄, 10Kg/ha MnSO₄, 5Kg/ha Borax 69.17 percent, surface irrigation method of irrigation 89.17 percent, interval between two irrigations, 8 to 10 days during summer 100.00 percent, application of Chlorpyrifos (20 EC) 15ml in 10 litres of water for woolly aphid (50.84 percent), application of lindane (6%) granules 16.6 Kg/ ha 53.34 percent, application of Phorate (10G) 25 kg/ha respectively, for control of white grub 79.17 percent, metallic

sound as maturity sign of sugarcane 100.00 percent, harvesting time of sugarcane for suru-12 to 13 months 100.00 percent.

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