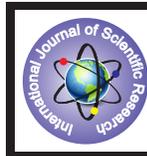


Extent of Adoption and its Influence on Impact Indicators of Sugarcane Production Technologies



Agriculture

KEYWORDS : Extent of adoption, Sugarcane farmers, Categorization, Impact indicators

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ABSTRACT

The research study was conducted to know the extent of adoption of sugarcane production technologies by the sugarcane farmers as perceived by them in chittoor district of Andhra Pradesh. The study revealed that land preparation, varieties, selection of planting material, optimum time of planting, weed management pre emergence, water management, earthing up and wrapping and propping of canes were found to be more significant in all the 5 categories of sugarcane farmers. The technologies seed rate, spacing, fertilizer dosage, zinc sulphate, chemical control for pests and chemical control for diseases were contributing significantly in increasing the net income from Rs.34999 and below of category V to Rs.85000 and above of category I. Hence these vital technologies need to be emphasized by the extension functionaries for its adoption.

Introduction

Sugarcane is the world's largest crop and is grown in over 110 countries. In 2009, an estimated 1,683 million metric tons were produced worldwide which amounts to 22.4% of the total world agricultural production by weight (FAO, 2009). India ranks second in cane area and sugar production after Brazil. The states of Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh together produce nearly 90 per cent of the cane and sugar in the country. Andhra Pradesh ranks fifth in sugar crop area of the country with a share of 4.83 per cent (Rao, I.V.Y.R. and Sunil, K.B.G. 2010). The average production of Andhra Pradesh is about 20.30 million tons contributing to 5.83 per cent of the total production of the country. In Andhra Pradesh, the major sugarcane growing districts in Telangana, coastal Andhra and Rayalaseema regions are Nizamabad, Visakhapatnam and Chittoor districts respectively.

The significant contribution of researchers, extension functionaries and farming community plays pivotal role in achieving the above success. On one side, the researchers developed sustainable technologies to meet the production requirements of the farmers followed by effective dissemination of technologies by the extension functionaries so as to bring the technologies to the farmers for adoption. On the other side, the farming community successfully adopting those technologies so as to increase the productivity levels of sugarcane. The technologies starting from land preparation to post harvest of sugarcane like ridges and furrows, time of sowing, method of sowing, seed rate, varieties, water management, weed management, nutrient management, pest and disease management, harvesting and so on were developed to increase the production and productivity levels of sugarcane.

The study was conducted to know the extent of adoption of technologies and its influence on the impact indicators viz. actual productivity, actual cost of cultivation and actual net income of the sugarcane farmers. The study was also probed on the vital technologies which contributed for differentiating the farmers in terms of impact indicators.

METHODOLOGY

Ex-post-facto research design was followed for the study. The investigation was carried out in Chittoor district of Rayalaseema region of Andhra Pradesh. Four mandals were selected in chittoor district purposively having highest area under sugarcane. From each mandal 3 villages were selected purposively. From each village, 10 sugarcane farmers were selected randomly

thus making a total of 120 respondents for the study. The data were collected with the help of by personal interview method through structured interview schedule.

Measurement of impact indicators

The actual values of impact indicators viz., productivity, cost of cultivation and net income obtained and incurred during the past three years were collected from the farmers. The average of past three years were calculated and the same was considered as the actual productivity, cost of cultivation and net income of each of the respondents.

$$\begin{aligned} \text{Actual net income} &= \frac{\text{Sum of the net income obtained for the past three years}}{3} \\ \text{Actual productivity} &= \frac{\text{Sum of productivity obtained for the past three years}}{3} \\ \text{Actual cost of cultivation} &= \frac{\text{Sum of cost of cultivation obtained for the past three years}}{3} \end{aligned}$$

Extent of adoption of different combinations of sugarcane production technologies

Thirty six technologies were screened by Agricultural Research Scientists and selected for the study. The extent of adoption of each sugarcane production technologies by the sugarcane farmers were analyzed by categorizing the sugarcane farmers on the basis of their actual net income as it is the determining factor for any economic endeavor. Based on the net income range, the respondents were categorized into 5 groups by following the class interval method. Under each net income category different combinations of technologies followed by the respondents in that category were analyzed in terms of percentage of adoption of sugarcane production technologies for each category.

Percentage of adoption of sugarcane production technologies for each category =

$$\frac{\text{Sum of percentage of adoption of technologies of each category}}{\text{Number of technologies}} \times 100$$

The technologies were then analyzed category wise by following pareto analysis so as to study vital few and trivial many for each category. Accordingly the most significant technologies adopted in each category were identified in terms of its maximum percentage of adoption. In each category the cumulative percentage of adoption has been calculated after sorting the technologies in the decreasing order of percent of adoption using Pareto principle. It identifies the vital few and trivial many (technologies). The technologies which contributed to approximately 50% of adoption have been identified.

FINDINGS

Distribution of respondents based on actual values of impact indicators

It is evident from the table 1 that about half (47.50%) of the respondents with high productivity followed by medium (32.50%) and low (20.00%) productivity levels. In case of cost of cultivation majority (63.33%) of the sugarcane farmers incurring medium cost of cultivation followed by high (19.16%) and low (17.50%) cost of cultivation. The net profit wise distribution of the respondents was concerned, majority (62.50%) of the sugarcane farmers were getting medium net profit followed by low (19.16%) and high (18.33%) net profit.

Table 1: Distribution of respondents based on actual values of impact indicators (n=120)

Impact Indicators	Productivity		Cost of cultivation		Net profit	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Low	25	20.83	23	19.17	15	12.50
Medium	71	59.17	78	65.00	82	68.33
high	24	20.00	19	15.83	23	19.17
Total	120	100	120	100	120	100
	Mean:50.619 S.D.:35.685		Mean:36389.177 S.D.:28396.083		Mean:69908.506 S.D.:37914.226	

The above result clearly indicating that, the farmers were getting higher productivity and they could be able to get higher net profit, might be because of lower cost of cultivation. The existing land preparation, varieties, seed rate, fertilizer dosage, water management and some other practices might be decreasing their cost of cultivation which in turn leads to high net profit.

Impact indicators under different combinations of technologies as followed by the sugarcane farmers

It is evident from the table.2 that farmers were classified into 5 categories on the basis of their net income by following class interval method.

The farmers with net income of Rs.85000 and above were classified under category I. The percentage of adoption of sugarcane production technologies by the respondents in this category was 88.27 per cent and nine farmers were fallen under this category. The productivity and cost cultivation ranges of this category were 53.66-60.00 ton/acre and Rs.22000 – Rs.32356.33 respectively.

Table 2: Categorization of respondents based on their net income and the combination of technologies followed under each category (n=120)

S. No	Category	Net income (range) /Rs.	Number of farmers	Combination of all the thirty six technologies followed under each category along with frequency and percentage of respondents						Percent-age of adoption	Productivity ton / acre	Cost of cultivation (range) /Rs.
1	I	85000 and above	9	1(9,100.00%)	+2(9,100.00%)	+3(9,100.00%)	+4(9,100.00%)	+5(9,100.00%)	+6(9,100.00%)	88.27	53.66 – 60.00	22000 – 32356
				+7(5,55.56 %)	+8(8,88.89 %)	+9(6,66.67 %)	+10(9,100.00%)	+11(9,100.00%)	+12(9,100.00%)			
				+13(5,55.56 %)	+14(4,44.44%)	+15(9,100.00%)	+16(9,100.00%)	+17(9,100.00%)	+18(9,100.00%)			
				+19(9,100.00%)	+20(9,100.00%)	+21(9,100.00%)	+22(9,100.00%)	+23(9,100.00%)	+24(9,100.00%)			
				+25(9,100.00%)	+26(9,100.00%)	+27(8,88.89 %)	+28(9,100.00%)	+29(7,77.78%)	+30(3,33.33%)			
				+31(9,100.00%)	+32(9,100.00%)	+33(9,100.00%)	+34(2,22.22%)	+35(9,100.00%)	+36(4,44.44%)			

category were 53.66-60.00 ton/acre and Rs.22000 – Rs.32356.33 respectively.

The farmers with net income of Rs.70000 – Rs.84999 were classified under category II. The percentage of adoption of sugarcane production technologies by the respondents in this category was 81.20 per cent and thirteen farmers were fallen under this category. The productivity and cost cultivation ranges of this were 51.00-56.66 ton/acre and Rs.23988 –Rs.34005 respectively.

The farmers with net income of Rs.55000 – Rs.69999 were classified under category III. The percentage of adoption of sugarcane production technologies by the respondents in this category was 69.44 per cent and eighteen farmers were fallen under this category. The productivity and cost cultivation ranges of this were 45.00-52.00 ton/acre and Rs.31476.33 –Rs.34887 respectively.

The farmers with net income of Rs.40000 – Rs.54999 were classified under category IV. The percentage of adoption of sugarcane production technologies by the respondents in this category was 55.90 per cent and fifty six farmers were fallen under this category. The productivity and cost cultivation ranges of this were 35.00-44.66 ton/acre and Rs.29986 – Rs.37000.55 respectively.

The farmers with net income of Rs.39999 and below were classified under category V. The combination percentage of adoption of sugarcane production technologies by the respondents in this category was 41.44 per cent and twenty four farmers were fallen under this category. The productivity and cost cultivation ranges of this were 30.00-34.66 ton/acre and Rs. 26988.5 – Rs.37000.66 respectively.

The combination of technologies adopted by the farmers categorized on the basis of net income in the table 2 revealed the category indicates its relative impact on sugarcane crop in terms of its impact indicators. These results facilitate in identification of suitable combination for better impact of sugarcane cultivation. The technologies which were relatively complex and had low observability were found to be not adopted by the majority of sugarcane farmers. This might be because of lack of awareness and knowledge among the farmers due to their less exposure with the extension personnel and mass media.

All the technologies one way or the other contributing for the productivity but the decisions made by the farmers in terms of its relative economic gain would impress the farmers for its adoption. The table also reveals that the farmers under different combination of technologies being adopted in sugarcane production. Farmers with education, high scientific orientation, management orientation, achievement motivation, innovativeness and other variables might be contributing for adoption of technologies and perceiving the impact of sugarcane production technologies as better and leading to continued adoption.

2	II	70000-84999	13	1(13,100.00%)	+2(12,92.31%)	+3(13,100%)	+4(13,100%)	+5(13,100%)	+6(13,100%)	81.20	51.00 - 56.66	23988 - 34005
				+7(4,30.77 %)	+8(13,100%)	+9(5,38.46%)	+10(13,100 %)	+11(13,100%)	+12(13,100%)			
				+13(5,38.46%)	+14(3,23.08%)	+15(13,100%)	+16(13,100%)	+17(13,100%)	+18(13,100%)			
				+19(13,100%)	+20(13,100 %)	+21(13,100%)	+22(13,100 %)	+23(13,100%)	+24(13,100%)			
				+25(10,76.92%)	+26(11,84.62)	+27(10, 76.92%)	+28(13,100%)	+29(4,30.77%)	+30(3,23.08%)			
				+31(11,84.62%)	+32(13,100%)	+33(13,100%)	+34(2,15.38%)	+35(10,76.92%)	+36(4,30.77%)			
3	III	55000-69999	18	1(18,100%)	+2(18,100 %)	+3(18,100 %)	+4(17,94.44 %)	+5(5,27.78 %)	+6(18,100%)	69.44	45.00 - 52.00	31476 - 34887
				+7(2,11.11 %)	+8(18,100%)	+9(0,0.00%)	+10(18,100%)	+11(18,100%)	+12(15,83.33%)			
				+13(13,72.22%)	+14(0,0.00%)	+15(9,50.00%)	+16(18,100%)	+17(18,100%)	+18(18,100%)			
				+19(18,100%)	+20(17,94.44%)	+21(18,100%)	+22(18,100%)	+23(18,100%)	+24(17,94.44%)			
				+25(2,11.11%)	+26(1,5.56%)	+27(2,11.11%)	+28(18,100%)	+29(0,0.00%)	+30(0,0.00%)			
				+31(18,100%)	+32(18,100%)	+33(18,100%)	+34(2,11.11%)	+35(18,100%)	+36(6,33.33%)			
4	IV	40000-54999	56	1(56,100%)	+2(55,98.21%)	+3(56,100%)	+4(44,78.57 %)	+5(0,0.00%)	+6(56,100%)	55.90	35.00 - 44.66	29986 - 37000.
				+7(1,1.79 %)	+8(45,80.36 %)	+9(0,0.00 %)	+10(2,3.57%)	+11(39,69.64%)	+12(16,28.57%)			
				+13(52,92.86%)	+14(0,0.00 %)	+15(2,3.57 %)	+16(39,69.64%)	+17(46,82.14%)	+18(42,75 %)			
				+19(56,100%)	+20(40,71.43%)	+21(48,85.71%)	+22(56,100 %)	+23(56,100 %)	+24(52,92.86%)			
				+25(1,1.79%)	+26(0,0.00%)	+27(0,0.00%)	+28(53,94.64%)	+29(1,1.79%)	+30(0,0.00%)			
				+31(52,92.86%)	+32(25,44.64%)	+33(54,96.43%)	+34(2,3.57%)	+35(53,94.64%)	+36(27,48.21%)			
5	V	39999 and below	24	1(24,100 %)	+2(22,91.67%)	+3(22,91.67%)	+4(0,0.00%)	+5(0,0.00 %)	+6(23,95.83 %)	4144	30.00 - 34.66	26988 - 37000
				+7(0,0.00 %)	+8(0,0.00%)	+9(0,0.00%)	+10(0,0.00%)	+11(24,100%)	+12(0,0.00%)			
				+13(13,54.17%)	+14(0,0.00%)	+15(0,0.00%)	+16(0,0.00%)	+17(24,100%)	+18(24,100%)			
				+19(24,100%)	+20(19,79.17%)	+21(18,75 %)	+22(24,100%)	+23(24,100%)	+24(7,29.17 %)			
				+25(0,0.00%)	+26(0,0.00%)	+27(0,0.00%)	+28(19,79.17%)	+29(0,0.00%)	+30(0,0.00%)			
				+31(4,16.67%)	+32(0,0.00%)	+33(14,58.33%)	+34(0,0.00%)	+35(24,100%)	+36(5,20.83%)			

Distribution of identified technologies contributed to 50% of adoption in each category

Note: Technologies along with numbers were given in the table 4

The table 3 shows the category wise technologies adopted to the extent of 50% by the sugarcane farmers. It is seen that the number of technologies adopted (up to 50%) from category-1 to category-5 had shown decreasing trend. It shows that in the higher net income group more technologies were adopted while in the lower net income group only a few technologies adopted.

Hence these vital technologies need to be emphasized by the extension functionaries for its adoption. It is in line with Rao (2006) and Karpagam *et al.*, (2009).

The table 3 clearly indicates the technologies 1, 2, 3, 6, 19, 21, 22 and 23 (land preparation, varieties, selection of planting material, optimum time of planting, weed management pre emergence, water management, earthing up and wrapping and propping of canes) were found to be more significant in all the categories. In comparison between category I to category V clearly indicates the technologies 4, 8, 13, 17, 28 and 33 (seed rate, spacing, fertilizer dosage, zinc sulphate, chemical control for pests and chemical control for diseases) were contributing significantly in increasing the net income from Rs.39999 and below of category V to Rs.85000 and above of category I.

Table 4 : Screened technologies in the serial order and their extent of adoption

Table 3: Distribution of identified technologies contributed to 50% of adoption in each category

Technologies	Categories				
	I	II	III	IV	V
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	6	6	6	6
6	6	17	19	19	19
8	13	19	21	21	21
13	17	21	22	22	22
17	19	22	23	23	23
19	21	23	28		
21	22	28			
22	23	33			
23	28				
28	33				
33					
TOTAL	14	13	11	9	8

S.No	Sugarcane production technologies	Extent of adoption
1	Optimum time of planting	99.17
2	Land preparation	100.00
3	Selection of planting material	98.33
4	Varieties	96.67
5	Weed management pre emergence	100.00
6	Wrapping and propping of canes	100.00
7	Chemical control for pests	93.33
8	Water management	88.33
9	Earthing up	100.00
10	Chemical control for diseases	90.00
11	Zinc sulphate	91.67
12	Seed rate	69.17
13	Spacing	70.00
14	Fertilizer dosage	73.33
15	Ferrous Sulphate	90.00
16	Crop rotation	81.67
17	Gap filling	85.83
18	Weed management Post emergence	81.67

19	Destruction of grasses on the bunds	78.33
20	Harvesting	94.17
21	Manures	65.00
22	Destruction of infested parts of cane	54.17
23	Intercropping	43.33
24	Trash mulching	35.00
25	Bio fertilizers	26.67
26	Post harvest technology	39.17
27	Sett treatment	22.50
28	Pheromone traps	12.22
29	Bio-control agent: Egg parasitoid	17.50
30	Release of predators	16.67
31	Detrashing of the crop	10.00
32	Planting of setts in 25 cm deep furrows	10.00
33	Stubble shaving	9.17
34	Method of application of fertilizers	5.83
35	Removal of water shoots	5.00
36	Sterilization of harvesting knives	6.67

CONCLUSION:

Through this study, the identified technologies which are vital for increasing the productivity and net income such as seed rate, spacing, fertilizer dosage, zinc sulphate, chemical control for pests and chemical control for diseases must be focused by the extension personnel. The study also projected the category wise adoption of different technologies which helps in providing right direction to the extension personnel.

REFERENCE

- FAO, 2009. Food and Agriculture Organization. FAO production yearbook. 62(153):104-105 | Rao, I.V.Y.R and Sunil, K.B.G. 2010. Sugarcane production and productivity trends in Andhra Pradesh during last three decades with special reference to North coastal districts of Andhra Pradesh. 24th meeting of sugarcane research and development workers of Andhra Pradesh. Souvenir. | Karpagam, C., Ravikumar, T., Ravichandran, V. and Murali, P. 2010. Impact of drip irrigation in sugarcane-A field level enquiry. Co operative Sugar. 43(2): 31-33. | Rao, S.R. 2006. The booklet on 'About North Coastal Zone' Regional Agricultural Research Station, Anakapalle: 2-3.