

## Adoption Dynamics of Improved Sugarcane Cultivation in Madhya Pradesh

Sandeep Chouhan<sup>1</sup>, S.R.K. Singh<sup>2</sup>, A.K. Pande<sup>3</sup> and U.S. Gautam<sup>4</sup>

1. M.Sc.(Ag.) Ext. Edu. JNKVV, Jabalpur 2. Senior Scientist (AE), ZPD Zone-VII, Jabalpur, 3. Professor (AE), JNKVV, Jabalpur, 4. Principal Scientist (AE), ZPD Zone-VII, Jabalpur

Corresponding author e-mail: singhsrk@yahoo.co.in

### ABSTRACT

*Adoption of the improved technology is the ultimate aim of the social scientists for enhancing the production and income of the farming system. This study was conducted in Burhanpur district of Madhya Pradesh during 2011-12 with the sample size of 120 respondents. The ex-post facto research design was used for the study. The findings revealed that around 74.16 per cent of respondents are medium category adopters of ISCP. Among the mass media utilization, it was found that 4.17 per cent and 12.5 per cent farmers listened to agricultural programme regularly and occasionally. Apropos scientific orientation, 67.5 per cent respondent had medium level and followed by 17.50 per cent had high level and 15.00 per cent had low level of orientation. Considerable majority of respondents (51.66%) not adopted disease management, while 44.16 per cent partially and only 4.17 per cent indicate full adoption of disease management practices. The study revealed that majority of sugarcane growers had poor adoption level about green manure application, soil testing, bio-fertilizer application, seed treatment, disease management and Integrated pest management. Thus, the study suggests for immediate attention of the extension functionary for convincing the sugarcane growers which would result in the higher adoption and income.*

**Key words:** Adoption; Improved technology; Disease management;

**S**ugarcane (*Saccharum officinarum* L.) is an important commercial crop of the world and is cultivated in about seventy five countries, the leading countries being India, Brazil, Cuba, Mexico and Thailand. The sugar industry plays an important role in the agricultural economy of India. Today sugarcane cultivation and sugar industry stands as supporting pillars of Indian economy. India occupies the second rank in production of sugarcane in the world. The area under sugarcane in India is 5.03 million hectares during the year 2011-12 and cane production of 342.20 million tonnes and productivity is 68.09 metric tonnes per ha. (Directorate of Economics and Statistics, Department of Agriculture and Cooperation, GOI). Sugar production this year is estimated to be around 24.2 to 24.5 million tonnes. India's annual consumption of sugar is around 22 to 23 million tonnes. As per the latest data from the ministry of agriculture, sugarcane has already been planted in around 4.56 million hectares of land. Madhya Pradesh stands at eleventh position both in terms of area and production in India. The area under sugarcane in Madhya

Pradesh was 0.06 million ha. And cane production is 2.54 million tonnes and productivity was 40.82 metric tonnes/ha) during the year 2009-10. Burhanpur district of Madhya Pradesh is one of the important sugarcane growing district in the state. The area under sugarcane crop in Burhanpur district was 4702.30 hectare, production is 282138 metric tonnes and productivity is 60.73 metric tonnes per hectare with a sugar recovery of 11.47 % during 2011-12 (*Anonymous 2011-12*). The major sugarcane varieties grown in Burhanpur district is Co-86032, Co-419, Co-94012, CoM-265, Co.VSI-9, CoC-671, VSI -434 etc.

Adoption dynamics refers to the rate of adoption commensurate with the system ability to cope with it. The increased production of sugarcane by way of adoption of new technologies necessitated modernization of sugar industry, thereby, boosting the agriculture based economy. The modernized sugar industries can crush any quantity of cane and to produce sugar products which resulted into increasing demand for sugarcane.

Although enough viable and adoptive technologies have been developed but many of these have not reached to the ultimate growers. There may be several reason for this including the technological as well social aspects. This study focuses on the factors and its relationship with each other with regard to sugarcane.

**METHODOLOGY**

The study was conducted in Burhanpur district of Madhya Pradesh. Burahanpur district comprises of two blocks namely, Burhanpur and Khaknar. An extensive survey was conducted in sugarcane growing villages. A sample of 120 sugarcane growers was drawn from sugarcane growing villages using proportionate random sampling technique. Based on the expert’s opinion, eighteen recommended sugarcane cultivation practices were selected for studying the extent of adoption. All the selected farmers were selected farmers were interviewed personally using a well-structured interview schedule. For analysis of collected data, descriptive statistics (frequency and per centage) and analytical statistics in this study was used.

**RESULTS AND DISCUSSION**

*Socio-economic profile of the sugarcane growers:*  
 In order to know the background and socio-economic status of the respondents, it is important to document these characteristics. In all, 10 socio-economic variables were studied using appropriate tools. The analyze data showed that majority (50.83 %) of the respondents were from middle age group (36-55 years). This finding has conformity with *Naik (2005)* and *Shivanand (2007)*. The highest proportions of the respondents (28.33 %) were educated middle up to 8th class, whereas 22.5 per cent were 12th class, 18.33 per cent were up to 5th class, 15.84 per cent were up to 10th class, 9.16 per cent were Undergraduate & above and only 5.84 per cent were illiterate. Majority (46.66 %) of the sugarcane growers were operating in large land holding (above 10 acres) and followed by 25.83 per cent were medium land holding (5.01-10 acres), 23.33 per cent were small land holding (2.51-5.00 acres)and only 4.18 per cent were marginal land holding (up to 2.5 acres). This finding has confirmation with *Kanavi (2000)*. Majority of the respondents (65.00 %) had medium level of farming experiences. This findings support by the work of *Marradi (2006)*. The maximum proportions of the respondents (52.5 %) had having middle level of annual

**Table 1. Profile of sugarcane growers (N=120)**

Variables	No.	%	Mean	S.D
Age			46.13	12.64
Young (<35 year)	31	25.83		
Middle (36-55 years)	61	50.83		
Old (>56 year)	28	23.83		
Education			8.6	3.85
Illiterate level	7	5.84		
Primary level	22	18.33		
Middle level	34	28.33		
High school level	19	15.84		
Higher Secondary level	27	22.5		
College level	11	9.16		
Land holding			14.4	12.54
Marginal land holding (up to 2.50 acres)	5	4.18		
Small land holding (2.51 to 5 acres)	28	23.33		
Medium land holding (5.01 to 10 acres)	31	25.83		
Large land holding (above 10 acre)	56	46.66		
Farming Experience			21.52	10.82
Less (Mean - SD)	27	22.5		
Medium (Mean ± SD)	78	65.00		
High (Mean + SD)	15	12.5		
Annual Income			3.63	2.21
Low (Up to 2 lakh)	41	34.16		
Medium (2.01 to 5 lakh)	63	52.5		
High (Above 5.01 lakh)	16	13.34		
Extension Participation			5.20	3.53
Less (Mean - SD)	21	17.5		
Medium (Mean ± SD)	73	60.84		
High (Mean + SD)	26	21.66		
Scientific orientation			10.42	1.05
Less (Mean - SD)	18	15.00		
Medium (Mean ± SD)	81	67.5		
High (Mean + SD)	21	17.5		
Training			0.20	0.40
Participated	12	10		
Non-participated	108	90		

income (Rs 2.01- 5.00 lakhs) followed by 34.16 per cent low income (<2 lakhs) and 13.34 per cent high annual income (>5.01 lakhs). Majority (91.00 %) of the respondents had joint family and only 9.00 per cent had nuclear family. Regarding extension participation, majority (60.84 %) of the respondents had medium level of extension participation. Majority of the respondents (67.5 %) had medium level of scientific orientation and followed by 17.50 per cent had high level and 15.00 per

cent had low level of scientific orientation. Majority of the respondent (90.00 %) had not participated in training and only 10.00 per cent had participated in the training. The finding is supported by the work of *Naik (2005)*. *Mass Media Utilization* : The data of Table 2 indicate that out of total sugarcane growers, 4.17 per cent and 12.5 per cent listen to agricultural programme regularly and occasionally, respectively. In case of general programmes, 11.67 per cent and 16.67 per cent listen regularly and occasionally, respectively. In case of television, 15 per cent viewed respondent the agricultural programmes regularly and 30.83 per cent viewed occasionally. In case of general programmes (i.e news, cinema, serials, sports and etc.) 74.17 per cent viewed regularly and 25.83 per cent occasionally. Whereas, in case of newspaper 15 per cent of growers read general information regularly and 62.5 per cent occasionally. In case of agricultural newspaper 5 per cent of growers read regularly and 12.5 per cent were read occasionally. Whereas, in case of farm magazine 4.17 per cent of respondents read agricultural aspect regularly and 12.5 per cent read occasionally. The findings are supported by the work of *Naik (2005)*.

*Overall adoption of ISCP* : The level of adoption in respect of improved sugarcane cultivation practices was studied by adding individual scores received on different practices. On the basis of the total score, they were categorized and the result presented in Table 3. Analyzed data shows that majority of the respondents (74.16 %) had medium level of adoption of ISCP. A negligible percentage of the respondents i.e. 13.34 per cent and 12.50 per cent had low and high adoption level respectively. The possible reason for the above findings may be the tendency of growers to adopt only those practices, which they feel are simple, involve low cost and are effective in getting higher yield. The results suggest a need for greater extension effort to provide know how of the

improved sugarcane cultivation practices to the respondents so that their adoption level is enhanced. Moreover, it was observed that farmers with more economic resource and extension agents contact were able to adopt more production technologies than others. The works of *Kanavi (2000)* also supports the present finding.

**Table 3. Distribution of sugarcane growers according to their adoption level**

Categories	No.	%
Less	15	12.50
Medium	89	74.16
High	16	13.34
Total	120	100

*Practices-wise level of adoption of ISCP* : In order to ascertain level of adoption of improved sugarcane cultivation practices, the responses of respondents were collected on 18 selected practices (Table 4) cultivation practices-wise were categorized in to three level of adoption i.e. full (score 3), partial (2 score) and nil adoption (0 score). Regarding field selection, over 80 per cent respondents selected the field, while 19.16 per cent did not make any selection. The majority of the respondents (62.50 %) indicated complete adoption of recommended practices while 37.50 per cent indicated partial adoption of field preparation. The majority of respondents (80.00 %) did not adopt soil testing at all only 12.5 per cent indicated complete adoption and 7.5 per cent showed a partial adoption. The majority of sugarcane growers (71.66 %) had partial adoption of improved recommended varieties while 15.84 per cent had completely adopted while 12.5 per cent did not adopt improved varieties. Regarding seed selection 60.00 per cent respondents partial adoption while, 35.00 per cent indicate complete adoption and 5.00 per cent were in low adoption category. The majority of growers (72.50 %) do not adopt seed treatment while 16.66 per cent

**Table 2. Distribution of sugarcane growers according to their mass media utilization**

Mass media source	Programmes	Frequency of use					
		Regular		Occasional		Never	
		No.	%	No.	%	No.	%
Radio	General	14	11.67	20	16.67	86	71.66
	Agriculture	5	4.17	15	12.50	100	83.33
Television	General	89	74.17	31	25.83	0	0
	Agriculture	18	15	37	30.83	65	54.17
News paper	General	18	15	75	62.50	27	22.5
	Agriculture	6	5	15	12.50	99	82.5
Farm magazine	Agriculture	5	4.17	15	12.50	100	83.33

partially and only 10.84 per cent indicate complete adoption of seed treatment. Regarding seed rate, higher per cent of respondents 61.67 per cent completely adopted the recommendation while 38.88 per cent indicate only partial adoption. The majority of sugarcane growers (56.67 %) indicate complete adoption while, 43.33 per cent indicate partial adoption of spacing. The most of the respondents (85.84 %) indicate partial adoption while 8.3 per cent indicate complete adoption and 5.83 per cent were in no adoption category of fertilizer application. The majority of respondents (70.00 %) indicate partial adoption while 25.83 per cent indicate complete adoption and 4.17 per cent were in low adoption category of organic manure application. The majority of respondents (79.16 %) do not adopt bio-fertilizer application while 16.66 per cent partially and only 4.17 per cent indicate complete adoption of bio-fertilizer application. Regarding green manure application, (86.66%) respondents do not adopt while, 10.83 per cent indicate partial adoption and 2.7 per cent were in complete adoption category of green manure application. The majority of respondents (73.33%) indicate partial adoption of irrigation management while 26.66 per cent were in complete adoption category of irrigation management. The most of the respondents (94.16 %) indicate medium adoption of weed management practices while, 5.84 per cent were in complete adoption category of weed management practices. The most of sugarcane growers (65.00 %) indicate partial adoption while, 35.00

per cent were in complete adoption category of earthing up. The majority of respondents (51.66%) do not adopt disease management while 44.16 per cent partially and only 4.17 per cent indicate complete adoption of disease management. Regarding insect pest management, higher per cent of respondent (75.00%) indicate partial adoption while 18.34 per cent indicate no adoption and only 6.66 per cent complete adoption of insect pest management. The majority of respondent (73.33%) indicate partial adoption of ratoon management while 12.00 per cent indicate complete adoption and 6.60 per cent were in no adoption category of ratoon management. Table 4 consisting of eighteen improved sugarcane cultivation practices and their level of adoption as per recommendation. Majority of the sugarcane growers (80.84 %) they adopted sugarcane in recommended soil. Majority of respondent (62.5 %) fully adopted field preparation practices. Only 12.5 per cent of the respondents fully adopt soil testing, 15.84 per cent of the respondents the growing improved variety.

*Relationship between Adoption dynamics and its factor :* With the assumption that adoption is influenced by various socio-economic characteristics of the respondents, the relationship of various socio-economic variables with the level of adoption ISCP among the sugarcane growers, Pearson product moment correlation coefficient 'r' was computed and compared. The result presented in Table.

**Table 4. Distribution of the respondents according to adoption level of sugarcane growers (N=120)**

Particulars	Level of adoption								
	Complete			Partial			No		
	No.	%	Rank	No.	%	Rank	No.	%	Rank
Field selection	97	80.84	I	23	19.16	XIII	00	00.00	-
Field preparation	75	62.50	II	45	37.50	XII	00	00.00	-
Soil testing	15	12.50	X	09	07.50	XVI	96	80.00	II
Improved varieties	19	15.84	IX	86	71.66	V	15	12.50	VII
Seed selection	42	35.00	V	72	60.00	VIII	06	05.00	X
Seed treatment	13	10.84	XII	20	16.66	XIV	87	72.50	IV
Seed rate	74	61.67	III	46	38.33	XI	00	00.00	-
Spacing	68	56.67	IV	52	43.33	X	00	00.00	-
Fertilizer application	10	08.30	XIII	103	85.84	II	07	05.83	IX
Organic manure application	31	25.83	VIII	84	70.00	VI	05	04.17	XI
Bio fertilizer application	05	04.17	XVI	20	16.66	XIV	95	79.16	III
Green manure application	03	02.50	XVII	13	10.83	IV	104	86.66	I
Irrigation management	32	26.67	VII	88	73.33	IV	00	00.00	-
Weed management	07	05.84	XV	113	94.16	I	00	00.00	-
Earthing up	42	35.00	V	78	65.00	VII	00	00.00	-
Disease management	05	04.17	XVI	53	44.16	IX	62	51.66	V
Integrated pest management	08	06.66	XIV	90	75.00	III	22	18.34	VI
Ratoon management	24	12.00	XI	88	73.33	IV	08	06.60	VIII

From the data depicted in Table 5, it is clear that correlation coefficient of eleven variables viz., age, education, land holding, farming experience, annual income, family type, extension participation, scientific orientation, training participation, mass media utilization and knowledge level were significant at 0.01 level of probability with adoption of ISCP. The findings reveals that age, education, land holding, farming experience, annual income, scientific orientation, extension participation, scientific orientation, training participation, mass media utilization and knowledge level had significant and family type had non-significant.

## CONCLUSION

On the basis of above-said discussion, it is concluded that majority of respondents belonged to medium adopter category. Further, majority of sugarcane growers had poor adoption level about green manure application, soil testing, bio-fertilizer application, seed treatment, disease management and integrated pest management. This is mainly due to the less participation and contacts with the extension agents. The findings of this investigation will help the extension system to redesign the activities for the transfer of technologies in sugarcane crop on the production, productivity, marketing and socio-economic status of sugarcane growers. It will also help in identifying major factors for high yield in the sugarcane production, technologies and feed back for the research system. The results will help

**Table 5. Correlation coefficient of independent variables of sugarcane growers with their adoption level of improved sugarcane practices**

Variables	Correlation coefficient with adoption level
Age	0.124*
Education	0.280**
Land holding	0.279**
Farming experience	0.213*
Annual income	0.407**
Family type	0.071NS
Extension participation	0.482**
Scientific orientation	0.255**
Training participation	0.393**
Mass media utilization	0.647**
Knowledge level	0.646**

\*Significant at 5% and \*\* Significant at 10% level.

the policy makers, administrators and planners to suit the existing situation in sugarcane cultivation practices and sugar industry. Besides, extension worker and change agent can take care of the factor affecting the constraints faced by the farmers. Moreover, higher adoption of the sugarcane technology will enhanced the production, which in turn it will lead to the sustainable livelihood and improved quality of life of the sugarcane growers.

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