

Sway of Selected Characteristics on Adoption of Watershed Crop Production Technology by the Farmers

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Abstract: Agriculture is largely depending on natural resources like soil, water and vegetation. Agricultural productivity depends on how efficiently these resources are conserved and managed. Rainfed areas have the stigma of low and uncertain productivity due to erratic and poorly distributed rainfall, which over the years had resulted in poor resources base of the farmers. The farmers in rainfed area are mostly following substantive low risk farming, their income are subjected to large fluctuation. High risk of crop failure further dissuades the individual farmers from using costly inputs for increasing production, although this area has potential to increase the production by adopting watershed crop production technologies. The present study was therefore planned. Behaviour takes place in situation, which have profound influence on the individuals action. The action process of individual is dependent upon many psychological, biological, cultural and physical factors involved in the situation. Since adoption is a mental process, the role of situation or an environment is very crucial. It was therefore assumed that the adoption of WCPT is governed by personal, social, economic and psychological characteristics. An attempt was made in the study to ascertain the relationship if any between selected socio-personal, economic, communication and psychological characteristics of the respondents and their extent of adoption of WCPT. The present study was undertaken in Banaskantha district of Gujarat state. Using purposive random sampling, three talukas viz., Palanpur, Vadgam and Danta were selected. All the 21 villages where the project was in operation during 10th Five Year were selected using proportionate random sampling. Total 200 beneficiaries were selected. Majority beneficiaries of watershed programme had medium level of extent of adoption of WCPT. Among various soil and water conservation technologies the practices viz., summer ploughing was adopted by 81.00 per cent respondents and was ranked first followed by sowing across the slope (53.00%) and tillage across the slope (51.00%) and were ranked second and third, respectively. The important characteristics of beneficiary farmers in relation to adoption of WCPT were: attitude, scientific orientation, social participation, irrigation potentiality, economic motivation, knowledge and risk preference.

Keyword: WCPT, Correlation, Relationship.

INTRODUCTION

The farmers in rainfed area are mostly follow subsistence farming and have low resources and their income is subject to large fluctuation. High risk of crop failure further dissuades the individual farmer from using costly inputs for increasing the production, although, this area has high potential to increase the production. In view of the above, development of rainfed areas assumes a major thrust

in attaining national food security and narrowing down regional socio-economic imbalance. This could be attained by following conservative production oriented programmes through integrated watershed approach.

Keeping in view the problem and potential of rainfed farming, the National Watershed Development Project in Rainfed Areas (NWDpra) was started during 1987-88 in Gujarat state. The

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present study was undertaken to examine the relationship between the characteristics of the beneficiaries and their extent of adoption of Watershed crop production technology (WCPT) with following specific objectives.

OBJECTIVES

To study the adoption of Watershed Crop Production Technology (WCPT) by the farmers

To ascertain the relationship between the characteristics of the beneficiaries and their extent of adoption of Watershed Crop Production Technology (WCPT)

To know the contribution of independent variables in explaining extent of adoption of Watershed Crop Production Technology (WCPT).

METHODOLOGY

The present study was undertaken in Banaskantha district of Gujarat state. Using purposive random sampling, three talukas *viz.*, Palanpur, Vadgam and Danta were selected, as these talukas are having similar agro-climatic condition, soil type and cropping pattern. A list of villages covered under NWDPR during 10th Five Year Plan in selected three talukas was obtained from the office of Gujarat State Land Development Corporation, Palanpur, the implementing agency of the project. There were 21 villages where the project was in operation during 10th Five Year Plan. All these villages were selected purposively to make the present study reliable. Using proportionate random sampling, 7.00 per cent beneficiaries were selected from each village making a sample of 200 respondents. The interview schedule was developed and the data were collected, tabulated, analysed and interpreted in light of objectives.

RESULTS AND DISCUSSION :

Extent of Adoption of Watershed Crop Production Technology by the Beneficiary Farmers

The "Adoption Process" is the mental process through which an individual passes from first hearing about an innovation to its final adoption while, "adoption" is a decision to continue full use of innovation.

With a view to find out extent of adoption of WCPT, the beneficiary farmers were asked to give the information about soil and water conservation practices and crop production technology of

watershed area adopted by them. On the basis of score obtained by the respondents and with, the help of Mean and Standard Deviation, they were classified into three categories. The classification in this respect is presented in Table 1.

Table 1
Distribution of the respondents according to their extent of adoption of WCPT

Sr. No.	Extent of adoption	Frequency	Per cent
1.	Low (Up to 43 score)	33	16.50
2.	Medium (44 to 67 score)	127	63.50
3.	High (Above 67 score)	40	20.00
Total		200	100.00

Mean (X) = 55.0300; S.D. = 11.7798

The results from the Table 1 indicate that 63.50 per cent of the respondents had medium level of extent of adoption of WCPT followed by 20.00 per cent with high level and 16.50 per cent with low level of extent of adoption of WCPT.

It can be concluded majority the beneficiaries of watershed programme had medium level of extent of adoption of WCPT. The reason might be due to medium level of knowledge and their moderately favourable attitude possessed by most of the respondents. Another reason might be due to sincere efforts put forth by implementing agency *i.e.*, GSLDC at grass root level to communicate the WCPT to farming community in watershed project area.

Practice-wise adoption of watershed crop production technology

In this study, an attempt has been made to assess the practice-wise adoption of WCPT by the beneficiary farmers. For this purpose, farmers were asked to mention their adoption of each practice in the form 'Yes' or 'No'. The frequency for each practice was then calculated and then transformed in to percentage of the respondents against each technology. Finally the rank was assigned on the basis of the percentage as shown in Table 2.

Table 2 indicate that among various soil and water conservation technologies the practices *viz.*, summer ploughing was adopted by 81.00 per cent respondents and was ranked first followed by sowing across the slope (53.00%) and tillage across the slope (51.00%) and were ranked second and third, respectively. The technologies *viz.*, land leveling (35.00%) and contour bunding (31.00%) were assigned fourth and fifth rank, respectively. Sixth rank was assigned to nala plugging (10.00%). The

practices adopted by less than 10.00 per cent respondents were; plantation on bunding for soil erosion (9.50%), recharging of wells (8.50%), construction of farm pond (7.00%) and small check dam (6.50%) which were ranked 7th, 8th, 9th and 10th, respectively.

Table 2
Practice-wise adoption of watershed crop production technology

Sr. No.	Technology	Frequency	Per cent	Rank
<i>[I] Soil and water conservation technology</i>				
1.	Land leveling	70	35.00	IV
2.	Summer ploughing	162	81.00	I
3.	Tillage across the slope	102	51.00	III
4.	Sowing across the slope	106	53.00	II
5.	Contour bunding	62	31.00	V
6.	Terracing	4	2.00	XII
7.	Nala plugging (use of stone/sand begs)	20	10.00	VI
8.	Plantation on bunding for soil erosion	19	9.50	VII
9.	Construction of farm pond	14	7.00	IX
10.	Recharging of wells	17	8.50	VIII
11.	Drip/sprinkler irrigation system	8	4.00	XI
12.	Small check dam	13	6.50	X
13.	Mulching	0	0.00	XIII
<i>[II] Crop production technology</i>				
1.	Use of improved/hybrid/ short duration varieties	191	95.50	I
2.	Timely sowing	130	65.00	VII
3.	Inter cropping	140	70.00	VI
4.	Mid season correction	60	30.00	X
5.	Use of organic manure	184	92.00	II
6.	Use of chemical fertilizers	164	82.00	V
7.	Interculturing	180	90.00	IV
8.	Weed management			
	(i) Hand weeding	182	91.00	III
	(ii) Use of herbicides	6	3.00	XIV
9.	Plant protection measures			
	(i) Seed treatment	12	6.00	XIII
	(ii) Pest control	104	52.00	VIII
	(iii) Disease control	22	11.00	XII
10.	Supplementary irrigation	68	34.00	IX
11.	Planting of trees (Fellow land field/boundary)	24	12.00	XI

Remaining technologies *viz.*, drip/sprinkler irrigation system and terracing were adopted by very meagre per cent respondents. It is unfortunate to note that none of the respondents had adopted mulching technology.

It could be thus be inferred from the above discussion that summer ploughing was come out as the most adopted practices, followed by sowing across the slope and tillage across the slope. The probable reason may be that the beneficiaries might

have under stood and realized the importance of summer ploughing to prevent soil erosion as well as conserving the moisture from run-off water.

While mulching was not adopted by any respondent. The probable reason might be that lack of information, less availability of mulches materials and skill oriented mulch labour.

So far as crop production technology was concerned the technology *viz.*, use of improved/hybrid/short duration varieties was adopted by 95.50 per cent respondents and was ranked first, followed by use of organic manure (92.00%) and hand weeding (91.00%) and were ranked second and third respectively. The technologies *viz.*, interculturing (90.00%), use of chemical fertilizers (82.00%) and intercropping (70.00%) were in fourth, fifth and sixth rank respectively. Seventh and eight ranks were assigned to timely sowing (65.00%) and pest control (52.00%), respectively. The practices *viz.*, supplementary irrigation (34.00%) and mid season correction (30.00%) were ranked 9th and 10th respectively. The respondents assigned 11th and 12th rank to planting of tree on fellow land/field boundary (12.00%) and disease control (11.00%). The practices adopted by very few farmers were seed treatment (6.00%) and use of herbicides (3.00%).

From the above discussion it could be concluded that use of improved/hybrid/short duration varieties was the most adopted practices followed by use of organic manure, hand weeding and interculturing, respectively. The probable reason might be that the farmers have increased their crop production per unit area by adopting improved/hybrid varieties without bearing more expense. The another reason might be that the improved varieties are being easily available at everywhere.

These findings are supported by Upadhyay *et al.* (1994) and Patel (2000).

RELATIONSHIP BETWEEN SOCIO-PERSONAL CHARACTERISTICS AND EXTENT OF ADOPTION OF WCPT

An attempt was made to ascertain the relationship between selected socio-personal, economic, communication and psychological characteristics of the respondents and their extent of adoption of WCPT. This was ascertained by computing coefficient of correlation (*r'* value). Table 3 show the results in this regard.

Table 3
Zero order correlation coefficient between selected characteristics of the beneficiary farmers and their extent of adoption of WCPT

Sr. No.	Characteristics	Correlation coefficient ('r' value)
[I]	<i>Socio-personal</i>	
1.	X ₁ Age	-0.2527**
2.	X ₂ Education	0.4620**
3.	X ₃ Social participation	0.6073**
[II]	<i>Economic</i>	
4.	X ₄ Occupation	0.2201**
5.	X ₅ Land holding	0.1600*
6.	X ₆ Herd size (Animal possession)	0.0923 ^{NS}
7.	X ₇ Irrigation potentiality	0.5306**
[III]	<i>Communication</i>	
8.	X ₈ Sources of information	0.5015**
9.	X ₉ Extension participation	0.5462**
[IV]	<i>Psychological</i>	
10.	X ₁₀ Scientific orientation	0.7277**
11.	X ₁₁ Economic motivation	0.7017**
12.	X ₁₂ Risk preference	0.6358**
13.	X ₁₃ Knowledge	0.5940**
14.	X ₁₄ Attitude	0.8122**

NS = Non significant,

* Significant at 0.05 level of significance,

** Significant at 0.01 level of significance

The results presented in Table 3 reveal that the calculated correlation coefficient showing relationship between characteristics of the respondents and extent of adoption of WCPT were found positively significant at 0.01 levels in case of education(0.4620), social participation (0.6073), occupation (0.2201), land holding 0.1600, herd size(animal possession) 0.0923^{NS}, irrigation potentiality (0.5306), sources of information (0.5015), extension participation (0.5462), scientific orientation (0.7277), economic motivation (0.7017), risk preference (0.6358), knowledge (0.5940) and attitude (0.8122). Whereas, age was found to be negatively and significantly (-0.2527) associated with adoption of WCPT at 0.01 level of significance. Only herd size could not established any significant relationship with adoption of WCPT.

CONTRIBUTION OF INDEPENDENT VARIABLES IN EXPLAINING VARIATION IN EXTENT OF ADOPTION OF WCPT

Efroymsons (1962) stated that step-wise regression is one method, which has been widely adopted in multiple regression analysis. It has got the added advantage that at each stage of analysis, every variable is subjected to an examination for its predictive value. Based on this approach, the step-wise multiple regression analysis was carried out to know the important variables with their predictive ability in explaining the variation in the dependent variable.

In step-wise regression analysis, all the 14 independent variables were considered and the results are presented in Table 4.

From the data presented in Table 3, it can be observed that out of fourteen independent variables, three variables *viz.*, attitude, social participation and extension participation were accounting influences on adoption of watershed crop production technology (WCPT).

All the three independent variables together accounted 68.86 per cent of variation as indicated by R² value for the extent of adoption of WCPT. It is to be noted that about 66.00 per cent change in extent of adoption had occurred due to attitude. The 'F' value was significant at 0.01 level of significance.

Attitude + Social participation accounted for 68.19 per cent and Attitude + Social participation + Extension participation were responsible for 68.86 per cent change in extent of adoption. The partial *b* value of these three variables were converted into standard partial *b'* value which were 0.6110 for attitude, 0.5004 for social participation and 0.1733 for extension participation.

The 't' value of attitude was highly significant. According to higher data values, the first rank order was assigned to attitude, second to social

Table 4
Step-wise regression analysis indicating important variables contributing extent of adoption

Independent variables	Multiple correlation coefficient (R)	Coefficient of determination (R ²)	'F' value	Partial regression coefficient (b)	't' value	Standard partial regression coefficient (b')	Rank order
X ₃ = Social participation	0.8258	0.6819	5.636*	1.8783	2.3740	0.5004	II
X ₉ = Extension participation	0.8298	0.6886	4.217*	0.2773	2.0535	0.1733	III
X ₁₄ = Attitude	0.8122	0.6597	173.152**	0.5527	13.1575	0.6110	I

Constant = 22.2915 Multiple R = 0.8298 R² = 0.6886

* Significant at 0.05 level of significance

** Significant at 0.01 level of significance

participation and third to extension participation. It is therefore, clear that the relative importance of attitude was more than social participation and extension participation.

CONCLUSION

It can be concluded that majority beneficiaries of watershed programme had medium level of extent of adoption of WCPT. Among various soil and water conservation technologies the practices *viz.*, summer ploughing was adopted by 81.00 per cent respondents and was ranked first followed by sowing across the slope (53.00%) and tillage across the slope (51.00%) and were ranked second and third, respectively. The important characteristics of beneficiary farmers in relation to adoption of WCPT were: attitude, scientific orientation, social participation, irrigation potentiality, economic motivation, knowledge and risk preference respectively. Therefore due weightage should be given to the above

characteristics of beneficiary farmers to achieve higher adoption of WCPT and thereby increasing yield, which should sustain the economic and overall development.

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