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RESEARCH ARTICLE :

Constraint analysis in use of soil and water conservation practices by the farmers in Amravati district, Maharashtra

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SUMMARY : A survey of 80 proportionately selected sample of farmers from Morshi and Amravati talukas of Amravati district of Vidarbha in Maharashtra revealed that majority of farmers had second category *i.e.* severe to some extent category of overall constraint severity index of SWCPs. Age, education, occupation, annual income, social participation, knowledge and adoption had no significant relationship with overall constraint severity index and land holding and extension contact had negatively significant with overall constraint severity index.

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KEY WORDS :
Constraint, SWCPs, Overall constraint severity index, Knowledge, Adoption, Mean constraint severity score

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BACKGROUND AND OBJECTIVES

Land and rain water are two primary resources associated with agriculture production. As consequences of increasing pressure on land the natural balance between soil forming and soil conservation processes has been affected to serious problem of soil erosion according to rough estimate, out of total geographical areas of 239 m ha of our country about 173 m ha are varying degrees and forms of soil erosion. The Vidarbha region of Maharashtra is spread over 11 districts, having 57.33 per cent cultivated areas, out of total geographical area of the region. The success or failure of crops, particularly under rainfed conditions solely depends on the rainfall pattern and the fertile land is eroded due to various reasons. There is need to study the status of farmers about soil and water conservation practices (SWCPs) in this region and to motivate them for reduce constraint in adoption of various soil and water conservation practices.

Objectives :

– To study the personal, socio-economic, situational, communicational characteristics of the farmers.

– To study the knowledge and adoption level of the farmers about selected soil and water conservation practices.

– To study the constraints faced by the farmers in use of soil and water conservation practices.

– To study the relationship between selected characteristics of the farmers with severity of constraints.

RESOURCES AND METHODS

The present investigation was carried during the year 2017-18 in Morshi and Amravati talukas of Amravati district of Vidarbha in Maharashtra. A sample of 80 farmers was taken from eight selected villages, with simple random sampling method. The data were collected by interviewing the farmers with the help of interview schedule. An exploratory design of social research was used for this study. For the measurement of constraint severity score, a list of constraint in adoption of soil and water conservation practices was prepared and responses of the farmers collected on it. Constraint severity index was measured on three point continuum *i.e.* low severe, severe to some extent and more severe.

OBSERVATIONS AND ANALYSIS

The results obtained from the present investigation are presented below:

Practice wise constraint in adoption of SWCPs:

Sowing direction :

From the Table 1 observed that the main constraint in adoption of practices was loss of nutrient from soil and water. This constraint with 0.688 mean constraint severity score rank first while sowing direction was difficulties in sowing or cultural practices or land operation and exposing of plant roots in sloppy land were rank II and rank III with MCSS 0.425 and 0.180, respectively.

Cropping system :

Table 2 shows that lack of knowledge about intercropping and crop sequence was the main constraint in adoption. This constraint rank I with MCSS 0.91. The constraints like unavailability of seeds, difficulty in management practices and difficulty in pest and disease control also found in adoption. These constraints rank II, III, IV, respectively.

Mulching :

Table 3 shows the different constraints in adoption of mulching practice. The constraint rank I with MCSS 1.86 was unavailability of mulching materials while other constraints like reduce mechanical operation, mulch acts as host for pest and disease rank II and III with MCSS 1.21 and 1.06, respectively.

Green manuring :

The data presented in Table 4 revealed that loss of season was the important constraint mentioned by the farmers (1.813, Rank-I), followed by lack of knowledge (1.54), lack of seed (1.09) and difficulty in cost incurred

Table 1 : Constraints in adoption of sowing direction by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Loss of nutrient from soil and water	0.688	I
2.	Difficulties in sowing / cultural practices / land operation	0.425	II
3.	Exposing of plant roots in sloppy land	0.180	III

Table 2 : Constraints in adoption of cropping system by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Lack of knowledge	0.91	I
2.	Unavailability of seeds	0.80	II
3.	Difficulty in management practices	0.66	III
4.	Difficulty in pest / diseases control	0.50	IV

Table 3 : Constraints in adoption of mulching by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Unavailability of mulching material	1.86	I
2.	Reduces mechanical operations	1.21	II
3.	Mulch acts as host for pest and diseases	1.06	III

in *in-situ* and *ex-situ* manuring (0.88) were the analyzed constraints in adoption of green manuring with Dhaincha / Sun hemp (Sole).

Surface drains :

The constraints shown in Table 5 found in adoption of surface drains practice as conservative measure of soil and water. The main constraints in adoption were reduction in operational area (Rank I, MCSS 1.31), lack of money (Rank II, MCSS 1.20) and lack of information (Rank III, MCSS 0.90).

Vegetative bunds :

The Table 6 shows that high intensity rainfall within few period damages the bunds was the constraint analyzed in adoption of vegetative bunding (MCSS 1.138, Rank I), followed by absence of natural grass to construct bunds (1.13, Rank-II), and stagnation of water on the soil surface due to flat land and in case of heavy rainfall (0.86, Rank-III) were the important constraints found in adoption of this technology by the farmers in study area.

Broad bed furrow method :

The Table 7 shows that lack of technical knowledge (0.45), high cost of establishment (0.15) were the constraints mentioned by the farmers in adoption of broad bed furrow method.

Ridges and furrow method :

The Table 8 shows that the main constraints in adoption of this practice were water logging during excess rainfall (Rank I, MCSS 1.21). The other constraints like cracking of soil if no rain occurs (Rank II, MCSS 0.325) and lack of knowledge (Rank III, MCSS 0.08) also found in adoption of this practice.

Table 4 : Constraints in adoption of green manuring by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Loss of one season	1.813	I
2.	Lack of knowledge	1.54	II
3.	Lack of seed	1.09	III
4.	Difficulty in cost incurred in *in-situ* and *ex-situ* manuring	0.88	IV

Table 5 : Constraint in adoption of surface drains by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Reduction in operational area	1.31	I
2.	Requirement of investment	1.20	II
3.	Lack of technical information	0.90	III

Table 6 : Constraints in adoption of vegetative bunds by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	High intensity of rainfall within few period damages the bunds	1.138	I
2.	Absence of natural grass to construct bunds	1.130	II
3.	Stagnation of water on the soil surface due to flat land and in case of heavy rainfall	0.86	III

Table 7 : Constraints in adoption of broad bed furrow method by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Lack of technical knowledge	0.45	I
2.	High cost of establishment	0.15	II

Table 8 : Constraints in adoption of ridges and furrow method by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Water logging during excess rainfall	1.21	I
2.	Cracking of soil if no rain occurs	0.325	II
3.	Lack of knowledge	0.08	III

Contour bunding :

The data presented in Table 9 revealed that lack of technical knowledge was main constraints in adoption and rank I with MCSS 1.88 while decrease in operational area rank II with MCSS 1.36 and high cost of establishment rank III with MCSS 1.05 were also the constraints in adoption of contour bunding as the practice of soil and water conservation.

Farm pond :

The data presented in Table 10 show that high initial investment and late sanctioning of subsidy from agriculture department was the main constraint identified with MCSS 1.83 and ranked-1, followed by less land holding and loss of land due to farm pond (1.3), high charges of maintaining on lining material and others (1.163), and scattered land holding (0.16) were the constraints in adoption of farm pond technology by the farmers.

Overall constraint severity index :

The data mentioned in Table 11 revealed that the majority 98.75 per cent of the respondents were observed in second category *i.e.* severe to some extent followed

Table 9 : Constraints in adoption of contour bunding by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	Lack of technical knowledge	1.88	I
2.	Operational area decreases	1.36	II
3.	High cost of establishment	1.05	III

Table 10 : Constraints in adoption of farm pond technology by the farmers

Sr. No.	Constraints	Mean Constraints Severity Score (MCSS)	Ranking of constraint
1.	High initial investment and late sanctioning of subsidy from Agriculture Department	1.83	I
2.	Less land holdings and loss of land due to farm pond	1.30	II
3.	High charges of maintaining on lining material and others	1.163	III
4.	Scattered land holding	0.16	IV

Table 11 : Distribution of respondents according to overall constraints severity index (n=80)

Sr. No.	Category	Respondents	
		Frequency	Percentage
1.	Low severe (upto 33.00)	01	01.25
2.	Severe to some extent (33.01 to 67.00)	79	98.75
3.	More severe (Above 67.00)	00	00.00
	Total	80	100

Table 12 : Regression analysis of independent variables with overall mean constraint severity score of identified constraints

Sr. No.	Variable	Co-efficient of regression 'b'	SE of'b'	t – stat
1.	Age	-0.045	0.036	-1.235
2.	Education	-0.214	0.142	-1.509
3.	Land holding	-0.817	0.349	-2.337*
4.	Occupation	-0.058	0.453	-0.129
5.	Annual income	-0.343	0.416	-0.824
6.	Topography of land	-1.941	2.774	-0.700
7.	Social participation	0.222	0.406	0.547
8.	Extension contact	-0.471	0.233	-2.020*
9.	Knowledge	0.298	0.635	0.469
10.	Adoption	0.561	0.288	1.947

$R^2 = 0.389$

F = 4.410

* indicates significance of value at P=0.05 level of probability

by 01.25 per cent under low severe category. Kudachi (2013); Parate (2014); Patale (2017) and Thakare (2010) also worked on the related topic and the results found were more or less similar to the present investigation.

Relational analysis :

The finding relational analysis in Table 12 shows that personal and socio-economic characteristics of farmer like age, education, occupation, annual income and social participation had shown no significant contribution with overall constraint severity score of identified constraints and other situational characteristic like topography of land and knowledge and adoption has also shown same result like no significant contribution with the overall constraint severity score of identified constraints. The data reveal that there was negative and significant contribution of land holding and extension contact level with overall constraint severity score of identified constraints. When all the 10 variables were fitted in multiple regression equation the co-efficient of multiple determination (R2) comes to 0.389 and the obtained R2 value was tested for its significance by computing "F" value and comparing it with "t" table value at n-k-1 degrees of freedom and was found significant. This shows that all the selected 10 variables contributed 38.99 per cent variation in overall constraint severity score of all identified constraints with the selected respondents. Similar work related to the present investigation was also carried out by Chavai and Shinde (2017); Dighe and Rajput (2010) and Supe *et al.* (2017).

Conclusion :

The present study concludes that although majority of the farmers have severe to some extent level of overall constraint severity index in adoption of recommended soil and water conservation practices. The probable reasons are situational, technical as well as financial constraints faced by the farmers in adoption of recommended soil and water conservation practices. Major constraints identified from the present investigation are lack of technical knowledge about contour bunding (MCSS=1.88), unavailability of mulching material (MCSS=1.86) and high initial investment and late sanctioning of subsidy from Agriculture Department (MCSS=1.83).

It is necessary to overcome these constraints to increase the awareness and adoption of soil and water conservation practices by the farmers in study area.

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