Adoption of Salinity Management Practices by Farmers' of Coastal Area of Western Gujarat

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ABSTRACT

Salinity has hampered the agricultural productivity of coastal region. Among the various factors responsible for decline in soil productivity, soil salinity is of primary concern. The salinity is a major menace to maintain the sustainability of production. The soil degradation affects first on agriculture and then it spreads over the rest of the facets of the society. The present research effort was made to study the adoption of management practices for salinity with 36 villages and 360 farmers of all saline strata. The findings revealed that majority of farmers i.e. 55% of class A, 78% of B and 58% of C were in the category of medium level adoption of salinity management practices. In highly saline tract, the practices adopted by farmer viz; rainwater recharge through check dam, selection of crop varieties and application of FYM were ranked first, second and third, respectively. No one had adopted the drip irrigation system in the study area. Age and social participation have significant impact on adoption level.

Key words: *Adoption, knowledge, salinity, management practices.*

Soil is one of the crucial natural resources essential for the existence of humanity. The soil degradation affects first on agriculture and then it spreads over the rest of the facets of the society. In India, salinity is spread over around 26 m ha of cultivable land.

In the Gujarat state, recently, the soil degradation through salinity has caught hold over 1.2 m ha of land. Of which, about 0.3 m ha occurs in the coastal area and rest 0.9 m ha comprises the inland saline area . About 1125 km long coastal line is in Saurashtra and Kutch which comprises about 0.1079 m. ha of saline land which need to be treated for salinity reduction .

The coastal belt of Saurashtra extending from Bhavnagar to Okha is known for its vegetables, fruits, sugarcane and other high value cash crops. But the problem of salinity has created an unfavourable situation for agriculture. Even low level of salinity can curtail the yield to the extent of 15 per cent while the medium level salinity can bring the productivity to 65 per cent down. The productivity of agriculture has been the slashed down the productivity of major crops by 18 to 50 per cent between Una to Madhavpur during 1971 to 1981 (*Golakiya et al., 1999*) and by two-third in coastal belt from Bhavnagar to Malia.

Much has been done to study the problem of salinity in terms of individual research efforts and Government efforts by way of appointing High Level Commission, or Khar Land Development Board. This has not provided a holistic approach for the problems. The socio-economic assessment and adoption of management practices of the salinity problem may verify the results of previous studies and provide proper perspective useful to formulate an efficient management plan to bear with the menace of salinity in coastal agriculture. With this view, the present study was undertaken with following specific objectives.

1. To study knowledge of farmers about salinity management practices
2. To study the extent of adoption of salinity management practices
3. To explore the relationship of salinity management practices with their selected characteristics

METHODOLOGY

The whole study area falls under three Agro-Climatic Zones namely; North-West Gujarat Zone V, North Saurashtra Zone VI and South Saurashtra Zone

VII. Out of these zones, the present study was confined to the situations 3 and 6 of zone V, situation 10 of zone VI and situations 3, 5, 7 and 8 of zone VII. The area of present investigation was comprised of 20 km wide soil strip along the sea coast of Saurashtra and Kutch. The selection of width of strip and its further division into small strata viz., 0-5 km, 6-10 km, 11-15 km and 16-20 km was made with consultation of soil scientists and past studies (*Kanzaria et al., 1985*) and also considering the extent of spread of salinity at present to make more homogenous strata for sampling. Two stage stratified random sampling technique was used with the village as first strata and the farmers as ultimate sampling unit. Thus, 36 villages were selected by selecting 9 from each strata, considering the ingress of salinity along the coastal line. Ten farmers were selected randomly from each village and a sample of 360 farmers was acquired for the present study.

The average chemical values of soil samples for both the periods, (September and May) were analysed, and its distribution among the various salinity classes as mentioned below, which was soil scientists suggested that could be more useful particularly for this study area to avoid complexity of interpretation.

ECE dSm^{-1}	Salinity class
<4	Non-saline or negligible saline (A)
4-8	Moderate saline (B)
>8	Strong to very strong saline(C)

The selected villages and farmers were classified into the different classes of salinity among the agro-climatic zones and situations within the zone to make groups that are more homogeneous and to make the results more comparable.

The knowledge of respondents regarding recommended salinity management practices was measured by asking the questions regarding salinity management practices. A set of objective type questions was prepared by referring related review of literature and in consultation with subject matter specialists. For measuring the adoption of salinity management practices, the adoption index was developed.

To study the association between dependent (adoption and knowledge) and independent (socio-economic characteristics) variables, the Pearson's product moment method of computing correlation co-efficient, which provides generally accepted means for measuring the association, was used (*Chandel, 1975*).

RESULTS AND DISCUSSION

Knowledge of salinity management practices: It is evident from the results presented in Table 1 that majority of the respondents in class A (non-saline), B (moderate saline) and C (highly saline) had medium level of the knowledge about the salinity management practices. The mean level of the knowledge for the A, B and C class was 22.81, 27.21 and 45.56, respectively. The calculated mean of class C (45.56) was higher than class A (22.81) and B (27.21). This was so, because the respondents in class C were severely affected by the soil and water salinity problem.

Table 1. Level of knowledge about salinity management practices.

Level of Knowledge	Salinity class					
	A (N=200)		B (N=110)		C (N=50)	
	No.	%	No.	%	No.	%
Low	27	13.50	19	17.30	6	12.00
Medium	145	72.50	71	64.50	36	72.00
High	28	14.00	20	18.20	8	16.00
Mean	22.81		27.21		45.56	

Adoption of salinity management practices: To ascertain the extent of adoption of the salinity management practices, the data were analysed and presented in Table 2. It is clear from the table that 55.00, 78.18 and 58.00 per cent were the medium adopters in A, B and C classes, respectively. This might be due to the fact that majority of the respondents, as discussed earlier, had the medium level of knowledge towards the salinity management practices. The calculated mean of class C was found higher as compared to class A and B. The reason behind this was that class C was highly saline tract as compared to other tracks and they were also more aware of salinity management practices.

Table 2. Extent of adoption of the salinity management practices.

Extent of Adoption	Salinity class					
	A (N=200)		B (N=110)		C (N=50)	
	N	%age	N	%age	N	%age
Low	51	25.50	9	8.18	12	24.00
Medium	110	55.00	86	78.18	29	58.00
High	39	19.50	15	13.63	9	18.00
Mean	18.48		21.16		36.10	

Practice wise extent of adoption of salinity management practices: On the basis of practice wise

scores obtained by the respondents in adopting a particular practice, the mean scores were worked out for all the individual practice and ranked all the recommended practices.

The perusal of data in Table 3 (Class A) showed that salinity management practices viz, rain water recharge through check dam/ well/ water harvesting was ranked first followed by application of FYM (rank second), inter culturing (rank third), primary tillage (rank fourth), selection of crop/variety (rank fifth) and sowing method (rank sixth).

The probable reason is that the first to sixth ranked practices commonly followed practices by most of farmers in any crops grown in study area. As rain water recharge through check dam is a group campaign practice carried out by the mass. Less adoption was found in class A for remaining practices because the farmers in class A were less affected by the salinity problems and these practices were for salinity management.

Similarly in class B (medium saline class), there were higher adoption for salinity management practices viz., primary tillage, rain water recharge through check dam/well/ water harvesting, application of FYM/cake/

Table 3. Practice-wise extent of adoption of recommended salinity management technology across the salinity classes

S. No.	Management Practices	Salinity class								
		Class A			Class B			ClassC		
		N	WMS	R	N	WMS	R	N	WMS	R
1.	Tank / Canal / River water mixing with poor quality water	49	3.19	I	24	2.84	II	21	5.46	I
2.	Khet talavadi	34	1.02	VII	22	1.20	VIII	20	2.4	VII
3.	Mixing of amendment in water by well	19	0.38	XI	20	0.73	XIV	19	1.52	X
4.	Use of drip irrigation system particularly in coconut or wide spaced crop.	0	0.00	XV	0	0.00	XVI	0	0	XVII
5.	In furrow, raised bed irrigation (Cotton, Wheat, Gram)	7	0.25	XIII	13	0.83	XII	16	2.24	VIII
6.	In shallow soil, use of poor quality water as protective irrigation to groundnut + FYM every two years	28	0.56	IX	27	0.98	X	18	1.44	XI
7.	Gypsum + poor quality ground water in groundnut – wheat sequence	0	0.00	XVI	20	1.27	VI	21	2.94	V
8.	Hedge around the field	13	0.39	X	21	1.15	IX	7	0.84	XIV
9.	Primary tillage	12	0.18	XIV	18	0.49	XV	23	1.38	XIII
10.	Mulching : Mulching with wheat straw @ 5 t/ha in pre monsoon groundnut	95	2.38	IV	80	3.64	I	34	3.4	IV
11.	Keeping land fallow	0	0.00	XVI	1	0.06	XVI	2	0.28	XV
12.	Selection of crop / variety	10	0.15	XV	2	0.05	XVII	2	0.12	XVI
13.	Sowing method	65	1.63	V	40	1.82	IV	36	3.6	II
14.	Interculturing	60	1.20	VI	26	0.95	XI	18	1.44	XI
15.	Application of FYM / Cake / Organic manure	135	2.70	III	35	1.27	V	36	2.88	VI
16.	In bajra - wheat sequence,use of N in three split : 1/3 each as basal, at tillering stage and earhead formation stage	101	3.03	II	34	1.85	III	29	3.48	III
17.	Utilization of saline waste land: sowing of forest tree spp. i.e. Shirish, Indian babul, Casurina, etc.	10	0.30	XII	14	0.76	XIII	16	1.92	IX
18.	Tank / Canal / River water mixing with poor quality water Salinity Class	17	0.60	VIII	19	1.21	VII	10	1.4	XII

N = No. of Respondents W = Weightage mean score R = Ranks

organic manure, selection of crop/variety, inter culturing, in shallow soil use of poor quality water as protective irrigation, utilization of waste land and water mixing in poor quality water in their order were observed.

The probable reason for the higher adoption of the first to fifth ranked practices was that they were commonly adopted practices. Some practices were least or no adopted, viz., mulching, keeping land fallow, mixing of amendment in water through well were not adopted by any farmers. These practices were not feasible as well as were costly too.

In class C (highly saline class), the practices adopted by farmers viz., rain water recharge through check dam, selection of crop variety, application of FYM and primary tillage were ranked first, second, third and fourth, respectively. The above soil practices were especially recommended for the salinity management so they were ranked higher in class C. Other practices were medium adopted by farmers viz., use of poor quality water as protective irrigation with poor quality water in shallow soil (fifth rank), inter culturing (sixth rank), tank/ canal/river water mixing with poor quality water (seventh rank), use of drip in coconut and wide spaced crops (eighth rank).

Association of respondents' extent of knowledge of salinity management practices with their selected characteristics: The correlation co-efficient was computed to ascertain the association between respondents' extent of knowledge and their selected characteristics, on the basis of the operational measures developed for each variable. The results are given in Table 4.

It can be inferred from the results that the education and social participation were positively and significantly associated with the knowledge in class A, B and C. The direction of association was positive and significant which indicates that the respondents' knowledge about management practice can be increased significantly through increasing of education level and social participation. For rest of the characteristics, the correlation coefficients were found non-significant in all the classes indicating no any significant impact on knowledge of farmers.

Association of respondents' extent of adoption of salinity management practices with their selected characteristics: The correlation co-efficient was computed to ascertain the association between respondents' extent of adoption and their selected characteristics, on the basis of the operational measures developed for each variable. The results are given in Table 5.

It is evident from the data that age and social participation of farmers were positively and significantly associated with the adoption behaviour of farmers in class A, B and C. The direction of association was positive and significant indicating that adoption level of farmers can be raised through increasing social participation. For rest of the characteristics, the correlation coefficients were found non-significant in all the classes indicating that adoption behaviour of farmers is indifferent towards these characteristics.

Table 4: Association between respondents' extent of knowledge and recommended salinity management practices with their selected characteristics.

S. No.	Name of variable	Salinity class		
		A	B	C
		N=200	N=110	N=50
		'r' value	'r' value	'r' value
1.	Age	-0.0183	-0.2706	-0.2154
2.	Education	0.2507**	0.5266**	.5126**
3.	Caste	0.0494	0.0223	-0.0163
4.	Social participation	0.2603**	0.3155**	.3393**
5.	Size of family	0.0689	-0.0884	0.0904
6.	Livestock holding	0.1018	-0.1935	0.1247
7.	Size of land holding	0.0929	-0.1345	-0.1236

** Significant at 1 per cent level.

Table: 5 Association between respondents' extent of adoption and recommended salinity management practices with their selected characteristics.

S. No.	Name of variable	Salinity class		
		A	B	C
		N=200	N=110	N=50
		'r' value	'r' value	'r' value
1.	Age	0.1785**	0.5674**	.4062**
2.	Education	0.0094	-0.2933	-0.3671
3.	Caste	0.0119	0.0355	0.1783
4.	Social participation	0.1834**	0.3731**	.3313**
5.	Size of family	-0.0159	-0.0888	0.1219
6.	Livestock holding	0.0655	-0.2102	0.1597
7.	Size of land holding	0.0604	-0.1467	-0.1564

** Significant at 1 per cent level

CONCLUSION

Knowledge and level of adoption of salinity management were examined for both the saline and non-saline tracts as some common practices were

followed in both the tracts. It is evident that majority of the respondents had medium level of the knowledge about the salinity management practices. But, the high mean value was found for salinity tract indicating the higher level of knowledge about salinity management practices. For majority of respondents i.e. 55.00 per cent farmers in non-saline tract and 58.00 to 78.18 per cent farmers in saline tract, the medium level of adoption was observed. In non -saline tract, medium level of adoption was found for the practices viz., rain water recharge, use of FYM/organic manure, intercultural operations and primary tillage in their order. These were the commonly followed practices by most of the farmers in the study area. Similarly in saline tract, medium level of adoption was observed for the practices viz., rainwater recharge, selection of crop variety, application of FYM and primary tillage with first, second, third and fourth rank, respectively. High ranks of these practices were because of their high impact of salinity. The positive and significant association of knowledge with education and social participation; and of adoption with age and social participation was observed. This has indicated that knowledge and adoption level of farmers can be raised with increasing education and social participation.

REFERENCES

1. Chandel, R.S. (1975). A Hand Book of Agricultural Statistics, Achal Prakashan Mandir, Kanpur.
2. Golakiya, B.A. and Gundalia, J.D. (1999). “Ksharmay Jaminma Kheti”. International Potash Institute, Switzerland, Gujarat Agricultural University and Potash Research Institute, Gurgaon. Junagadh, pp. 1-118.
3. Kanzaria, M.V.; Patel, M.S.;Gundalia, J.D. and Patel, C.L. (1985). Physico-chemical charactristics of salt affected soils of coastal belt of Saurashtra, Kutch and North Gujarat. Paper presented in a seminar on the Management of saline alkaline soils held in the month of February, 1981, GAU, Junagadh, Gujarat, pp. 1-5.