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Constraints in Adoption of Saline Soil Management Practices by the Farmers of Belagavi District

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ABSTRACT

Soil plays a vital role in sustaining life on the planet. Except food harvested from marine environment, nearly all the food that humans consume is grown using the soils. The 'expost-facto' research was conducted in Belagavi district of Karnataka during the year 2017-18 to study the constraints faced by farmers in adoption of saline soils management practices. Belagavi district has maximum area of salinity affected land due to improper soil management practices followed by the farmers. In Belagavi district, three taluks were selected based on the highest area under salinity. The total sample size was 150. The results revealed that majority of the farmers were middle aged with education up to primary level having medium farm experience and medium annual income. In addition to this, most of the farmers belonged to medium mass media category, medium extension contact and medium farm resource base. The variables like education, annual income, mass media exposure, extension contact, organizational participation and farm resource base had positive and significant relationship with the knowledge and adoption of saline soils management practices by the farmers. High initial cost for undertaking recommended salinity management practices was the major problem expressed by the farmers. Hence, there is an immediate need to tackle these problems by developing a strategy for the supply of inputs on cost effective basis, if not on subsidized rates.

Keywords : Adoption, Knowledge, Management, Organic manure, Salinity

MASSIVE irrigation infrastructure facilitated spectacular changes in Indian agriculture. Some of these changes are desirable, while others are undesirable. It is desirable because it richly contributed commercialization of agriculture. Large scale irrigation coupled with introduction of high yielding varieties and fertilizers (HYVs) in the mid-1960s led to 'green revolution' that paid rich dividends in terms of food production and increased agricultural production. This enabled the country to achieve self-sufficiency in food grain production, as about 55.00 per cent of the total agricultural production is contributed by irrigated land (Anonymous, 2009).

The intensive agriculture accompanied by subsidies on crucial inputs like irrigation, electricity, fertilizer and support price policy stimulated the farmers to adopt new technologies without much consideration on long term implications of exploitative process at the aggregate level. In the absence of adequate drainage and other management practices the ground water balance was disturbed resulting in excessive irrigation water.

Because of seepage from water conveyance systems and deep percolation losses from farms during irrigation, the rate of recharge to the ground water increased resulting in the progressive rise of water table, which when unchecked led to water logging in the irrigated commands. Rising water table brought salts to the surface causing secondary salinization. These problems are evident in most of the irrigated area causing severe negative externalities. This is not only affecting agricultural production dramatically, but is also hampering the productivity, food security, soil health and bio-diversity. This is directly attributed to the problem of over irrigation for high water consuming crops in the upstream that result in emergence of water logging and salinization in the low-lying areas and subsequently spread to adjoining elevated lands. These problems have not only threatened the sustainability of irrigated (Umali, 2014)

agriculture but also have far reaching socio-economic ill effects both for the farmers as well as the society at large.

Water related degraded soils differ considerably in distribution. Central Soil Salinity Research Institute, Karnal reported that Gujarat has highest area under salinity (16.80 lakh ha) followed by West Bengal (4.4 lakh ha), Rajasthan (1.9 lakh ha), Maharashtra (1.84 lakh ha) and Orissa (1.47 lakh ha) (Anonymous, 2016).

To prepare effective reclamation plans, we need to have good inventories of salt affected soils, waterlogged soils and poor quality water, besides documenting their characteristics, distribution and use potentials. Excellent inventories of the extent of lands damaged by salinity and water logging in irrigation commands updated at least every five years are very much needed. It should be backed up by a strong mechanism of information dissemination in the form of readily available text, maps, graphs and associated data base to multiusers. Keeping all this in view, the present study was planned to know the constraints faced by farmers in adoption of saline soils management practices.

Methodology

Based on highest area under salinity, Athani, Ramdurg and Saundatti taluks of Belagavi district were purposively selected for the study. From each taluk five villages were selected. From each village ten respondents were selected randomly.

Hence, the study covered 15 villages from three taluks of Belagavi district to form a sample of 150 respondents. A pre-tested structured interview schedule was used to collect the data from the respondents by personal interview method. Primary data was collected through structured interview schedule in an informal environment. Interview schedule was prepared by incorporating the variables listed for the study (Table 1) and pre-tested in non-sampling area, before administering to respondents.

Table 1

Variables and their empirical measurement

Variable	Measurement tool
Age Education Farming experience	Direct questioning
Annual income	Classification according to the Ministry of Rural Development, Government of India
Mass Media Exposure	Structured interview schedule was developed
Extension contact	Structured interview schedule was developed
Organizational participation	Structured interview schedule was developed
Farm resource base	Structured interview schedule was developed

To know the constraints faced inadoption of saline soils management practices from the farmer's point of view, a list of constraints were prepared after extensive review of literature, consulting expert in the field and the respondents were asked to give their opinion by answer 'Yes' or 'No'. The frequency of constraints as indicated by the farmers was the basis for ranking of the constraints.

Appropriate statistical tools were used for analysing the collected data. The primary data collected from the respondents were scored, tabulated and analysed using the statistical tools and techniques *i.e.,* Mean, Standard deviation, Frequency and Percentage and Karl Pearson's product movement correlation coefficient as follow :

$$r = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{(n\Sigma x^2 - (\Sigma x)^2 (n\Sigma y^2 - (\Sigma y)^2)}}$$

Where,

- r = Simple correlation coefficient
- Σx = Sum of x variable
- Σy = Sum of y variable
- Σx^2 = Sum of square of x variable
- Σy^2 = Sum of square of y variable
- $(\Sigma y)^2$ = Square of sum of y variable
- Σxy = Sum of xy variable
- n = Number of paired observations

Results and Discussion

The results in the Table 2 depicted that majority of the farmers were middle aged (48.66%) with education up to primary level (29.33%), having medium farm experience (44.00%) and medium annual income (37.33%). In addition, 36.67 per cent of the farmers belonged to medium mass media category, 39.33 and 37.33 per cent of them were having medium extension contact and farm resource base. The results are in conformity with the findings of Sisodia *et al*. (2009); Kale *et al.* (2012) and Bariya *et al.* (2016).

Education plays a key role in exposing an individual to various kinds of mass media like newspaper, magazine, radio, TV and mobile. Mass media have a bundle of information that enhances knowledge and adoption behavior of an individual about improved technologies of saline soils management practices. Farmers were having good contact with extension functionaries at Agriculture universities, Krishi Vigyan Kendra and Raitha Samparka Kendras.

To utilize farmer's potentiality effectively and higher population in rural areas, the government encouraged establishment of Raithasangha and Youth clubs in rural areas. Hence, a greater number of farmers became the members of Raitah sangha and Youth clubs. Further, village co-operative societies provide the inputs like fertilizers, pesticides and credit facility to its members.

Many farmers are growing commercial crops like sugarcane, cotton, groundnut, maize and getting good market value which increases the amount of farm resources due to the presence of high income.

A cursory look at the results in Table 3 revealed that education, annual income, mass media exposure, extension contact, organizational participation and farm resource base had positive and significant relationship with the knowledge of farmers about saline soils management practices. But age and farming experience had positive and non-significant relationship. It implies that knowledge level of the respondents about saline soils management practices increases with increase in their education, annual

Table 2

Profile characteristics of farmers

(n=150)

Category	Frequency	Percentage
Age		
Young (< 35 years)	30	20.00
Middle (35 – 50 years)	73	48.66
Old (> 50 years)	47	31.34
Education		
Illiterate	31	20.67
Primary (1st to 4th)	45	29.33
Middle school (5th to 7th)	25	16.67
High school (8th to 10th)	21	14.67
PUC	15	10.00
Graduation	13	8.66
Farming experience		
High (> 28 years)	40	26.67
Medium (15 – 28 years)	66	44.00
Low (10 –15 years)	29	19.33
Very Low (< 10 years)	15	10.00
Annual income		
Low (Up to ₹ 60,000)	45	30.00
Medium (60,001 – 1,20,000)	56	37.33
High (>1,20,001)	49	32.67
Mass media exposure		
Low (<11.55)	53	35.33
Medium (11.55-18.96)	55	36.67
High (>18.96)	42	28.00
Extension contact		
Low (<1.28)	55	36.67
Medium (1.28-2.27)	59	39.33
High (>2.27)	36	24.00
Organizational participation		
Low(> 3.35)	55	36.67
Medium (3.35-5.06)	56	37.33
High (>5.06)	39	26.00
Farm resource base		
Low (< 9.89)	46	30.67
Medium (9.89-13.54)	68	45.33
High (>13.54)	36	24.00

TABLE 3

Relationship between knowledge on saline soils management practices and socio-economic characteristics of farmers

(n=150)

Socio-economic characteristics	'r' value
Age	0.024
Education	0.494 **
Farming experience	0.032
Annual income	0.413 **
Mass media exposure	0.543 **
Extension contact	0.478 **
Organizational participation	0.250 **
Farm resource base	0.347 **

** Significant at 0.01 level

income, mass media exposure, organizational participation, extension contact and farm resource base. The results are in line with the findings of David *et al.* (2014) and Singh *et al*. (2014).

A perusal of Table 4 indicated that there was a positive and significant relationship at one per cent level between education, annual income, mass media exposure, extension contact, organizational participation and farm resource base with adoption of saline soils management practices by the farmers. Whereas, age and farming experience had positive and non-significant relationship. Respondents with better education, mass media exposure, extension contact, organizational participation and farm resource will enable an individual to gain knowledge and motivates them to adopt saline soil management practices. The results are in conformity with the findings of Kale *et al.* (2012).

TABLE 4

Relationship between adoption of saline soils management practices and socio-economic characteristics of farmers

(n=150)

Socio-economic characteristics	'r' value
Age	0.021
Education	0.397 **
Farming experience	0.036
Annual income	0.430 **
Mass media exposure	0.453 **
Extension contact	0.274 **
Organizational participation	0.274 **
Farm resource base	0.437 **

** Significant at 0.01 level

The results presented in the Table 5 and Fig. 1 revealed that majority (83.33 %) of the farmers expressed high initial cost for undertaking recommended salinity management practices as the main constraint. The reason could be practices like sub-surface drainage, land leveling and other soil management practices require high initial investments. The small and marginal farmers might not be able to afford this huge cost.

TABLE 5

Constraints faced by the farmers in adoption of saline soils management practices

(n=150)

Constraints	Frequency	Percentage
High initial cost for undertaking recommended salinity management practices.	125	83.33
Lack of technical guidance to farmers in adoption of salinity management practices.	106	70.67
Non-availability of organic manures.	95	63.33
High rate of interest on bank loans to adopt salinity management practices.	90	60.00
No common out-let for removing surface drainage water.	70	46.67
Non availability of good quality water.	62	41.33
Lack of training for adoption of salinity management practices.	57	38.00
Fragmentation of land into unconventional shape and size	52	34.67
Non-availability of extension literature on soil management practices	49	32.67
Lack of reinforcement efforts from the department	45	30.00

The Mysore Journal of Agricultural Sciences

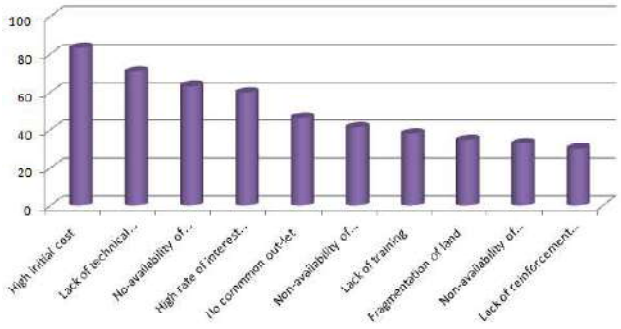

Fig. 1: Constraints faced by the farmers in adoption of saline soils management practices

The findings are in conformity with the findings of the study conducted by Jadhav *et al*. (2010) and Kale *et al.* (2012).

Adoption of saline soils management practices was limited by lack of technical guidance (70.67 %) and this might be due to poor participation in extension activities on saline soil management practices. Non-availability of organic manure was a major problem (63.33 %) as organic manures are becoming a scarce resource in village because of poor livestock possession and more inclination towards chemical fertilizers. This needs a serious view in order to attain sustainability in production and maintenance of good soil health. The results are in line with the findings reported by Ramasubramaniyan *et al.* (2013) and Singh *et al.* (2014).

The present state of credit facilities is not satisfactory as rate of interest is very high and there exist tedious procedures in advancing loan. This makes farmers to depend on private money lenders. Therefore, high rate of interest on bank loan was expressed by 60.00 per cent of farmers as a constraint. No common outlet for removing excess water was expressed by 46.67 per cent of farmers. The out-let needs to be constructed for removing the excess water but that was not possible due to lack of involvement and poor organization of farmers in solving the problem. The findings are in conformity with the findings of the study conducted by Bariya *et al.* (2016).

The farmers are not interested to take training, which might have prevented the farmers in acquiring new skills for the management of saline soils. Krishi Vigyana Kendras are conducting training on various aspects like salinity management, irrigation management and land development activities, but only few farmers have undergone training. Nearly two fifth (38.00%) of farmers have expressed lack of training for adoption of salinity management practices as a constraint, because they might not be aware of training programmes conducted by Krishi Vigyana Kendras. Many farmers (41.33 %) expressed the problem of non-availability of good quality water because of drought was main reason. Sources of good quality water are river and rain; both are limited in the study area. Fragmentation of land into unconventional shape (34.67%) and size and non-availability of extension literature on soil management (32.67%) were also major problems for the farmers. The results are in line with the findings reported by Bharat and Grewal (2007); Sisodia *et al*. (2009); Kulshreshta & Kushwaha (2010); Joginder *et al*. (2010) and Kale *et al.* (2012).

Less than one third (30.00%) of the respondents expressed that lack of reinforcement efforts from the department was the major constraint encountered in the adoption of saline soils management practices. Though the Department of Agriculture and other organizations publish booklets, leaflets and folders on improved package of practices, specific extension literature on saline soils management is very much limited. The necessity of such literature solely on saline soils is truly reflected in the form of constraints encountered by the farmers. Hence, the Department of Agriculture and other concerned agencies must publish specific extension literature and conduct demonstrations on saline soil management practices.

Suggestions Offered by the Farmers

The data in Table 6 and Fig. 2 showed that majority of the respondents expressed that they need financial assistance for adoption of saline soils management (46.67%), more technical information on different aspects of salinity management practices (30.00%) and awareness campaign on saline soils management practices should be conducted in the affected villages

TABLE 6

Suggestions offered by the farmers

(n=150)

Suggestions	Frequency	Percentage
Financial assistance for adoption of salinity management practices.	70	46.67
Bank loan should be availed at lesser rate of interest.	52	34.67
Need for more technical information /guidance by extension functionaries.	45	30.00
Increased the subsidy amount	42	28.00
Adequate supply of inputs for maintenance of salinity management practices.	35	23.34
Awareness campaign on saline soils management practices should be conducted in the affected villages	32	21.34

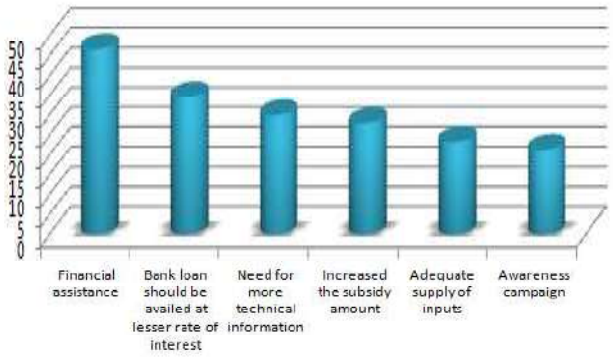

Fig. 2: Suggestions offered by the farmers

(28.00%). Adequate supply of inputs for maintenance of salinity management practices was expressed by 23.34 per cent of farmers, since the practices like sub-surface drainage and land leveling requires high cost, government departments and non-governmental organizations should assist the farmers in timely adoption. Bank loan should be made available for lesser interest rate was expressed by 34.67 per cent of the respondents as higher interest rate prevailing and procedure hurdles in banks prevent farmers to avail loans.

More than one fourth of farmers (28.00%) suggested to increases the subsidy amount as the practices like sub-surface drainage, land leveling and other soil management practices require higher investments. The small and marginal farmers might not be able to afford this huge amount. Hence, subsidy from government will assist the farmers to adopt the saline soils management practice on their field. The results are in conformity with the findings reported by Raghunandan (2004).

Productivity of land decrease gradually due to improper soil management practices and this leads to salinity problem. In order to increase the soil fertility, recommended saline soils management practices like surface drainage, sub-surface drainage and land levelling are necessary. A lot of emphasise has been given to adopt these saline soils management practices to increase the agricultural production. To address this, the Government of India and Karnataka has initiated a massive programme of soil health with the support of international organizations. In addition to these efforts made through conservation related projects considerable attention has been put in place for the promotion of saline soils management practices through national extension package programme as a part of agricultural development strategies.

High initial expenditure in adoption of saline soils management practices and lack of technical guidance to farmers in adoption of salinity management practices were the major constraints expressed by the farmers. Hence, there is an immediate need to develop a strategy for supplying the inputs on subsidized rates.

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