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Adoption of saline soils management practices by the farmers

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Abstract
The study was an *"expost-facto"* research carried out in Belagavi district of Karnataka State during the year 2017- 18. In Belagavi district, three taluks were selected based on the highest area under salinity. The total sample size was 150. The results revealed that large majority (80.00 %) of farmers have adopted surface drainage followed by growing salt tolerant crops (69.33 %). The overall adoption of saline soils management practices by the farmers showed that 42.67 per cent of the respondents were belonged to medium level of adoption of saline soils management practices followed by low (36.00 %) and high (21.33 %). The probable reasons might be that adoption of saline soils management practices requires precise and full knowledge and utmost care. Majority of the farmers have completed primary school education, high farming experience, medium extension contact and mass media exposure. All these factors might have influenced the adoption of saline soils management practices. Hence, there is an immediate need to improve the adoption behavior of farmers by developing a strategy for the supply of inputs on cost effective basis, if not on subsidized rates.

Keywords: Salinity, surface drainage, sub-surface drainage, bio-drainage, adoption

Introduction
Recognizing the importance of soil health in all dimensions, 2015 has been declared as the "International Year of Soils" by the 68th UN general assembly. Food and Agriculture Organization of the United Nations has formed global soil partnership with various countries to promote healthy soils for healthy life and world without hunger. India, the second most populous country in the world faces severe problems in agriculture. It is estimated that out of 328.8 m ha of total geographical area in India, 173.65 m ha are degraded, producing less than 20.00 per cent of its total yield. In order to achieve the food security, it is necessary to improve the management practices in agriculture. Farming community should give more importance to the irrigation because improper irrigation may leads to adverse effect on their land.

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" which paid rich dividends in terms of food production and brought many-fold increase in 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. 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 inevitably resulted in disturbance to the groundwater balance that existed prior to irrigation. 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 commands causing severe negative externalities. Effect of this on agricultural production is dramatically hampering not only the productivity and food security but also the soil health and bio-diversity. This predicament is directly attributed to the problem of over irrigation for high water consuming crops in the upstream resulting in emergence of water

logging and salinization in the downstream in the low lying areas and subsequently spread to adjoining elevated lands.

Water related degraded soils differ considerably in distribution. Among the states, the highest area affected by salinity are Gujarat (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).

To prepare effective reclamation plans, we need to have good inventories of salt affected soils, waterlogged soils and poor quality waters 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 multi users.

Materials and Methods

The Belagavi district comprises of ten taluks among these Athani, Ramdurg and Saundatti taluks were purposely selected based on highest area under salinity. From each taluk five villages were selected. From each village ten respondents were selected randomly.

Hence, the study covered 15 villages from 3 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. The data collected from respondents were tabulated and analyzed using appropriate statistical tools such as frequency, percentage mean and standard deviation.

Adoption of respondents with reference to saline soils management practices was measured based on package of practices recommended by University of Agricultural Sciences (UAS), Dharwad. The adoption constituted totally eight saline soil management practices. The responses elicited from the respondents were quantified as followed and not followed of recommended practices. A score of 1 for followed and 0 for not followed was assigned.

The maximum score that respondents could obtain was eight and the minimum was zero. Depending upon the total score obtained by each of the respondent, they were grouped into three categories with mean and standard deviations as a measure of check and are expressed as below

Table 1: Type of category

Category	Score
Low	Less than (Mean – 0.425 SD)
Medium	Between (Mean ± 0.425 SD)
High	More than (Mean + 0.425 SD)

Further frequency and percentage were calculated to present the data.

Results and Discussion

Adoption of saline soils management practices by the farmers

The results in the Table 2 indicated that, large majority (80.00 %) of the farmers have adopted surface drainage practice. The reasons might be that, it is a low cost technology by using this method more than sixty per cent of management work is completed. The equipments to carry out this activity are easily available. It is the simplest and easiest method which is performed by the farmers. Because of these reasons, majority of farmers have adopted surface drainage method. The results are in line with the findings reported by Jadhav *et al.* (2010) [3].

More than two third (69.33 %) of the farmers have adopted the practice of growing salt tolerant crops. The probable reason might be that, compared to other crops cotton and wheat give more yield in saline soils. Growing these salt tolerant crops will make salinity affected land into good condition which results in improving soil nutrient status and helps to growing of other drought resistant crops during uneven distribution of rainfall. In case of cotton, due to the presence of deep root system it can absorb the excess moisture from the saline soils. So that it can provide a better yield than other crops. Because of these reasons majority of farmers were growing salinity tolerant crops in saline soils. The findings are in conformity with the findings of the study conducted by Kale *et al.* (2012) [5].

Table 2: Adoption of saline soils management practices by the farmers (N=150)

Sl. No.	Saline soil management practices	Followed		Not followed	
		f	%	f	%
1.	Leveling of land	64	42.67	86	57.33
2.	Surface drainage	120	80.00	30	20.00
3.	Sub surface drainage	62	41.33	88	58.67
4.	Bio-Drainage	18	12.00	132	88.00
5.	Construction of bunds for impounding water	90	60.00	60	40.00
6.	Removal of impounded water after 8-10 days	60	40.00	90	60.00
7.	Frequency of impounding water 2/3 times	46	30.67	104	69.33
8.	Growing of salt tolerant crops	104	69.33	46	30.67

More than half (60.00 %) of the farmers have adopted construction of bunds for impounding water. It might be due to severity of salinity in that area made them to adopt this method. It is the important management practice because excess amount of salts present on surface of saline soils get dissolved in water by this method. Government also helped the farmers in construction of these bunds which shows importance of this practice. Because of these reasons, majority of farmers have adopted construction of bunds for impounding water method. The findings are in conformity with the findings of the study conducted by Datta *et al.* (2002) [2].

More than two fifth (42.67 %) of farmers have adopted levelling of land. This might be due to the reason that it is an old practice and they know the practical utility of this practice such as increase the water infiltration and reduce the soil erosion. Due to application of this practice it is possible to avoid the stagnation of water in the field. This leads to overcome the problem of salinity. But it is an expensive method which hinders the farmers to adopt land levelling. The findings are in conformity with the findings of the study conducted by Bagadi *et al.* (2001) [1] and Kadam *et al.* (2001) [4].

More than two fifth (41.33 %) of the farmers have adopted sub-surface drainage. The probable reasons might be that, high initial cost and requirement of specific technical knowledge inhibited them from adopting this method. This practice is used to maintain the water table below the root zone depth and drains the excess water and salts out of the affected area through gravity or pumped outlet. The main advantage of this practice is there is no wastage of land occurred as it is found in surface drainage. The results are in line with the findings reported by Singh *et al.* (2014) [7].

Only 12.00 per cent of farmers have adopted bio-drainage practice. The reason might be due to it is a new concept to that area, so farmers do not know much about bio-drainage. Because of this reason the farmers did not adopt this practice. In bio-drainage, the farmers are growing plants like Eucalyptus and Dalbergia. These plants will draw the excess water from the field which helps to overcome the problem of salinity. And the farmers with good extension contact and mass media exposure have adopted bio-drainage practice. The findings are in conformity with the findings of the study conducted by Kale *et al.* (2012) [5] and Ramasubramaniyan *et al.* (2013) [6].

Overall adoption of saline soils management practices

The results in Table 3 indicated that more than two fifth of farmers (42.67 %) are in medium adoption category with respect to saline soils management practices. While, 36.00 and 21.33 per cent of them were in low and high adoption category as far as adoption of saline soils management practices were concerned.

The reason might be that, adoption of saline soils management practices requires precise and full knowledge and utmost care. Majority of the farmers have completed primary school education, high farming experience, medium extension contact and mass media exposure. Hence, all these factors might have influenced the adoption of saline soils management practices. Probable reason for the farmers to be in medium adoption category might be due to the medium knowledge possessed by more than two fifth (41.33 %) of the farmers, since knowledge limits action of individuals, as it is pre-requisite for any individuals to either adopt or reject a practice.

Table 3: Overall adoption of saline soils management practices by the farmers (n=150)

Category	Frequency	Percentage
Low (<2.97)	54	36.00
Medium (2.97-4.54)	64	42.67
High (>4.54)	32	21.33
Mean = 3.76	SD = 1.84	

F = Frequency % = Percentage

Conclusion

Rapid growth of population leads to continuous pressure on land resulting in the deterioration of soil fertility. In order to sustainable production and conservation of soil, package of soil health management practices very necessary to reduce further damage to soil and to conserve the land for further generation.

It was revealed from the study that majority of farmers were medium adopters of saline soils management practices. The present study revealed that, high initial cost was required in adoption of land leveling and sub-surface drainage was the major constraint expressed by the farmers. There is an immediate need to tackle this problem by developing a strategy for the supply of inputs on cost effective basis, if not on subsidized rates.

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