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Physico - chemical characteristics of salt affected soil from Barhanpur, M.S., India

B. S. Mali, S. S.Thengal, P. N. Pate

Department of Botany, Tuljaram Chaturchand College, Baramati, M. S., India

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ABSTRACT

Salt affected areas, due to excess irrigation are major problem all over irrigation the world. Due to excess irrigation, the salt present in the water remain saturated in the soil. Assessment of seasonal variation in the salt concentration is a tool for knowing the status of saline soil. In the present work an attempt is made to study the seasonal variation in physiochemical properties viz. E.C., pH and mineral composition of the agriculture supporting salt affected soil from Barhanpur site. These studied parameters show seasonal variation.

Key words: Physicochemical characters, salt affected areas, soil.

INTRODUCTION

The problem of salt affected soil is a case of global occurrence and it affects developing as well as developed countries. Nearly 20% of worlds cultivated area and nearly half of the worlds irrigated lands are affected by salinity. Salt – affected soils could be produce as result of use of salt containing irrigation water, presence of high amount of salt in the soil and high level of ground water table [15]. Saline soils lose their productivity and possibility of turning them into unproductive once [9]. Crop varieties differ in their response to various biotic and abiotic stresses. Excessive salt concentrations decrease water potential and thus result in reduced water availability to the plant. Under such situations plants often show wilting due to physiological drought. Poor germination, seedling emergence and establishments under saline conditions lead to poor crop productivity [2]. However, it is reported that salinity stress affected the grain yield, vegetative growth, number of capsules in black seed (*Nigella sativa*) excluding number of lateral shoots [5]. In case of germination percentage of seeds of *Borge officinalis* decrease with increase in NaCl concentrations [6].

Unfortunately due to use of indiscriminate irrigation and chemical fertilizers, now- a- days soil around the Neera river is becoming saline. So the salinity has become a major problem in this area, with respect to crop production and income generation of the local people.

There is much information available on physico-chemical properties of soil with naturally growing salt tolerant plant but very meager data is available on saline soil supporting agricultural crops.

Thus, salt affected areas, due to excess irrigation are major problem all over the world. Due to excess irrigation, the salt present in the water remain saturated in the soil. Assessment of seasonal variation in the salt concentration is a tool for knowing the status of saline soil. In the present work an attempt is made to study the seasonal variation in physicochemical properties viz. E.C., pH and mineral composition of the agriculture supporting salt affected soil from Barhanpur (Tal. Baramati, Dist.Pune) M.S., India.

MATERIALS AND METHODS

Seasonally soil samples (0-15) were collected from barren saline soil at Barhanpur (Tal. Baramati, Dist. Pune, M.S., India). Soil samples were sundried, powdered and there after used for chemical analysis. 100g of soil was taken in conical flask and 300m1 of distilled water added to prepare 1:3 soil water suspensions. The suspension was thoroughly shaken and kept overnight. The solution was filtered and the filtrate taken to K.V.K. Malegaon for chemical analysis.

RESULTS AND DISCUSSION

Barhanpur :
The location of this site is about 7 Km in the north of Baramati Tahasil of Maharashtra state, several hectare of soil under crop are salt affected leads to change in physico-chemical characters of this salt affected soil (Table-I) showed pH fluctuating between 6.98 to 8.25 and there by suggesting the alkaline in nature of soil.

Salinity varied between 0.76 to 1.24 $dS.m^{-1}$ (in 1:3 soil distilled water proportion) values of parameter reached to maximum during summer season due to increase of sodium and chloride. This range of salinity is in agreement with those reported by Nazila khorsandi [14]. The SAR (sodium absorption ratio) values ranged from 2.66 to 4.48. Further analysis of saline soil showed dominance of Na^+ and K^+ in the range of 4.11 to 4.61 Meq./lit. and 6.56 to 11.30 Meq./lit respectively their accumulation in soil was low in monsoon as compaired to summer season.

The result indicated magnessium (Mg^{2+}) accumulated in greater concentration than calcium (Ca^{2+}). Amount of former varied between 1.2 to 6.65 Maq./lit and that of latter 0.85 to 1.25 Meq./lit. The low concentration of total carbon content (T.C.C) did not show much variation (0.31 to 0.58). Similarity no recognizable relationship existed between various level of HCO_3 and Na^+ and $C1^-$, principal constituent of salinity varied between 4.48 to 5.11 Meq./lit and 3.8 to 5.5 Meq./lit respectively.

This finding also indicated a progressive increase in their concentrations in winter and summer (Table. – I). RSC and Mg^{2+}/Ca^{2+} ratio throughout the year did not show any seasonal fluctuation.

Soil :
According to Waisel [18] absorption of nutrient by the plant and growth of plants depend upon the pH of their habitat. The present investigation show the pH varied between 6.98 to 8.25. [1] recorded pH of saline soil supporting succulent halophytes fluctuated between 7.5 to 8.2. Similarly, recorded pH values fluctuating between 7.90 to 8.80 for salt affected saline soil from Baramati tehsil in M.S., India [4]. Salinity is a severe problem in many regions of the world which changes physico-chemical characteristics of soil. In salt-affected soil pH inhibits water and nutrient uptake although there is sufficient quantity of them in soil [10,5].

Salinity :
It is universal that the distribution of salt tolerant plants depends on soil salinity, which primarily affect the vegetational growth of plant [16]. The result (Table- I) shows that salinity of salt affected fluctuated between 0.76 to1.24 $dS.m^{-1}$.

Salinity in the top layers of soil tended increase due to high rate of evaporation during summer month, whereas the leaching taken place during monsoon.

Such seasonal changes in salinity in habitat of halophytes and mangroves were studied by [8,7].

SAR :
When SAR is 15 or more Na^+ is responsible and for changing physico-chemical properties of soil and which hamper the uptake of water by plants [17].

Similarly SAR for soil supporting *Salvadora persica* varied between 2 to 44 [11]. Thus, it is clear that selected site for present research investigation show SAR value similar to the soil which support salt tolerant plant communities.

Ionic composition :
It was shown earlier that Na^+ (4.48 to 5.1 Meq./lit). and Cl^- (3.8 to 5.5 Meq./lit) were major constituents of soil salinity (Table I). It was further observed that concentration increased remarkably in summer.

The available information indicates that halophytic grasses namely *Aeluropus lagopoides* and *Saprobolous*

madrasptanits grown on a soil with Na^+ and CI^- range between 7 to 20 and 8 to 45 for former and 2.3 to 47 and 3 to 16 Meq./lit for the later species [3, 13]. Likewise concentration of Ca^{2+}, Mg^{2+} and K^+ in soil supporting halophytic vegetation fluctuated in the ranges noted for sites selected for the present investigation. This study collectively suggest that if salt tolerant plants are introduced scientifically salt affected soil can be converted into productive soil.

Table : I; Seasonal variation in Physico-chemical characteristics of salt affected soil at Barhanpur (Tal.Baramati, Dist.Pune, M.S.India)

Sr. No.	Physico-chemical characteristics	Monsoon Season	Winter Season	Summer Season
1	p^H	6.98	8.25	8.1
2	EC ($ds.m^{-1}$)	0.76	1.02	1.24
3	Na^+ %	68.72	58.32	41.37
4	R.S.C	5.35	6.00	4.5
5	S.A.R	4.48	3.61	2.66
6	Ca^{++} Meq/lit	0.85	1.25	0.95
7	Mg^{++} Meq/lit	1.2	2.05	6.65
8	Na^{++} Meq/lit	4.11	4.48	4.61
9	K^+ Meq/lit	6.56	7.91	11.70
10	HCO_3 Meq/lit	7.4	9.3	6.9
11	$C1^-$ Meq/lit	3.8	5.5	5.3
12	T.C.C. (Total Carbon Content)	0.31	0.49	0.58
13	Mg^{++} / Ca^{++}	1.43	1.14	6.53

CONCLUSION

Variation in physico-chemical, characteristics of salt affected soil collected from Bharanpur, M.S.India, indicated high salinity and dominance of Na^+ and Cl^- resulted in high SAR value in summer as compared to other seasons.

This suggests that it would be better to sow seeds or cultivate plantlet in such a soil when salinity of study site is minimum that is in monsoon. It is recommended that farmer should avoid over irrigation, stop using chemical fertilizer, use drip irrigation system and apply biological fertilizer.

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REFERENCES

[1] A.J. Joshi, Eco-Physiological aspects of some tropical Salt-marsh halophytes in contribution to the ecology of halophytes. D.N.Sen and K.S.Rajpurohit, Dr.W.Junk publisher, Hague, Netherlands **1982**, 189-1950.
[2] A.K.Agnihotri, and O.P.Singh, Impact of canal irrigation in arid region. Annual Report CSIR Karnal. India – **2006**. 173-175.
[3] A.S.Bhoite, Ph.D. Thesis, Bhavnagar University, Bhavnagar (India Bhavnagar **1987**).
[4] B.S.Mali, BCUD research project OSD/184, Pune University, Pune (India,Pune – **2011**).
[5] D.W.Johnson, S.E. Smith and A.K.Dobrenz, *Theor. Appl. Genety*, **1992**,83,833-838.
[6] E.B.Sajirani, M.J.Shakouri and S.Mafakherig *Annals of Biological Research*, **2011**, 2(6) : 414-416.
[7] G.V.Joshi, Report P.L. 48 Project No. A.7- swc – 95. Shivaji University, Kolhapur, M.S. (India, Kolhapur **1976**).
[8] I.A.Unger, Inland halophytes of the United Sates. In : Ecology of halophytes (R.J. Reimold and W.H.Guess edts). Academic Press, New York **1972**.
[9] L.L.Somani and M.C.Lodha, *Marketing saline land bloom Indian farmers and digest*, **1973**, 6, 49-51.
[10] M.Bor, F.Ozdenir and I. Turkan, *Plant Sci*., **2003,** 164, 77-84.
[11] M.Krishnakumar, Ph.D thesis, Bhavnagar University, Bhavnagar (India – Bhavnagar, **1986**).
[12] M.Majidi, H.Akbar, S.Kalamian and K.H.Mohammad, Proceedings of the third Iranian conference on medicinal plants, Shahed Univ., Tehran, Iran, **2007**, 153.
[13] M.Mishra, Ph.D. thesis, Bhavnagar Univ., Bhavnagar (India, Bhavnagar **1990**).
[14] N.Khorsandi and H.Chamheidar, *Annals of Biological Research*, **2012**, 3(5), 2292-2296.
[15] R.D.Horney, B.Taylor, D.S.Munk, B.A.Roberts, S.M.Lesch and E.P.Richard, *Computer and Electronics in Agriculture*, **2005**, 46, 379-397.
[16] R.J.Reimold and Queen, Ecology of halophyte (R.J.Reimold and W.H.Queen edts) Academic Press, New York, **1974**, 345-353.
[17] R.S.Whitney and M.Peech, *Proc. Soil. Sci-Amer*, **1952**, 16, 117-122.
[18] Y.Waisel , Biology of Halophytes, Academic Press New York. **1972**.