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Physico-chemical characteristics of rhizosphere saline soil of *Chenopodium album* L. from Baramati Tehsil, Dist. - Pune, India

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ABSTRACT

The salinity of soil is greatest problem in the world. Salt affected soil create abiotic stress to the growing agricultural crops. The important reasons for soil, salinization is no proper management of arid and semiarid area, irrigation water, industrial water, polluted river, indiscriminate use of chemical fertilizers. The increased level of salinity in soil, causes decreases in soil fertility. Present work focuses on the studies of physico-chemical characteristics of rhizosphere soil supporting to the *Chenopodium album* L. High soil salinity negatively decrease in effect on plant shoot height, root length, leaf size, and seed germination which leads to its yield. The finding shows that the pH range between 8.7 to 8.9 and E.C. (dS.m-1) ranges between 0.80 to 0.90. The accumulation of Na^+ is higher than k^+ in the rhizosphere soil collected from Songaon and Khandaj. Thus, the soil salinity effects on crop which results in reduction of yield. Growing in saline areas in Baramati Tehsil (M.S.) India.

Key words: *Chenopodium album L.,pH, Physico-chemical characteristics, Soil salinity.*

Introduction

The Baramati Tehsil is located western region of Maharashtra. It is located between latitudes 18° 02′ 44″N and 18°23′19″ in the north and 74° 13′8″ and 74° 42′ 47″ in the east longitudes. It is situated 538 metres above the mean sea level (Ogale and Nagarale, 2014).

Neera River soil is gradually getting salinized as a result of the uncontrolled use of irrigation and chemical fertilizers. So, in terms of crop production and local's ability to make a living, salinity has emerged as a significant issue in this region. Globally, both emerging and wealthy nations are affected by the issue of manmade salt-affected soil. Salinity has an impact on close to 20% of all cultivated land and close to 50% of all irrigated land. The use of water in irrigation contains salt, a high concentration of salt in the soil, and excessive salinity levels can result in soils that are impacted by salt (Mali *et al.*, 2012). According to studies on soil which leads to change in physico-chemical characteristics of soil. Soil salinity represents a significant problem of world agriculture field, more than 800 million hectares of land are thought to be impacted by salt. These soils include a variety of saline soils, saline-sodic soil and sodic soils (Rengasamy, 2010).

Salinity is reduced agricultural productivity due to arid region and the presence of soluble minerals in saline soil. The quantity of Na+ ions in a soil were known as its sodicity. Salinity and sodicity of the soil could had an impact on soil characteristics, soil

chemical reactions, including pH, and the transfer of nutrients to plants. Because sodium-bicarbonate were present in alkaline soils, pH and salinity typically in rise (Al Busaidi and Cookson, 2003). The involvement from various mixtures of mineral in cations and anions, as well as biological compounds with many activity units. Despite the wealth of knowledge available on soil pH, little is known about how alkaline soils maintain their PH levels. Arid soil typically has an alkaline pH and is mostly made up of the interchangeable cations Ca^{2+}, Mg^{2+}, Na^{+}, and K^{+}. Such cations are frequently referred to as bases or base-forming cations, and breakdown of them is thought to result in soil alkalinity (Tavakkoli *et al.,* 2015).

To recent studied of soil salinization refers to the build-up of salts in the soil root zone to the pointed where it inhibits plant growth. Salt-affected soils were distinguished by an excessive amount of dissolved mineral salts, mainly composed of chlorides, sulphates, carbonates, bicarbonates of sodium, calcium and magnesium all of the continents had salt-affected soils on a global scale and around 100 countries confronted this threatened. Over one thousand one hundred twenty-eight million hectares of agricultural land worldwide had been damaged by salinity (Gunarathne *et al.,* 2020).

One of the most serious environmental issues in the world is high concentrations of soluble salts, primarily sodium chloride and sodium sulphate in soils. To study such as farm soil physicochemical characteristics, pH, exchangeable sodium and electrical conductivity, are altered as a result of salt build up Sodium uptake ratio, exchangeable sodium percentage, soil available water capacity is every indication of the conductivity of a saturated paste. As a result, most crop yield and their accessibility of water and minerals for the development of plants are impacted (Joachim *et al*., 2010). one of the most important challenges to the world food security has been and is soil salinity. In dry and semiarid places all over the world, this soil salinity caused by either natural or human-made factors has been acknowledged as a severe obstacle to land development. it is possible to view soil salinity as a significant abiotic stress that significantly lowers crop production in saline soil conditions (Ramady *et al.,* 2018).

Salinization may be linked to excessive groundwater extraction brought on by the needs of expanding industry, agriculture, and urbanisation. salinity has been shown in different studies to raise the concentrations of N, P, Ca^{2+}, Mg^{2+} and Na+ and reduced the amount of K+ in the short the salinity of grains causes the concentration of Na to rise and the concentration of P to fall, but it has no effect on the concentrations of N, K^{+}, Ca^{2+} and Mg^{2+}. Plant absorption of water and nutrients is hampered (Sabareshwari, 2018).

(Shelke *et al.,* 2019) Alkaline soil is abundant in the cation's calcium, magnesium, sodium along with the Anions carbonates *viz*. bicarbonates, the most harmful salt, is made up of sodium and chloride ions and accounts for in excess of fifty percent of all the salts that are soluble. According to Joshi A J and Iyengar E r r, 1987) reported on Organic solutes such as amino acids, organic acids, sugars, and inorganic ions, primarily Na^{+} and CI^{-}, have been shown to act as osmoregulatory components in halophytes. Organic solutes such as amino acids, organic acids, sugars, and inorganic ions, primarily Na^{+} and CI^{-}, have been shown to act as osmoregulatory components in halophytes.

Materials and Method

The soil uppermost layer was collected and depth 0-10cm agriculture saline soil collected from Songaon, Khandaj, Mekhali (Baramati Tehsil). Soil sample were sundried, powdered form and there used for chemical analysis. soil the taken 1:3 soil water suspensions, 100g of dry soil sample and 300ml of distilled water were introduced to a conical flask After a suspension good shake, the suspension was left overnight. After filtering the mixture, the filtrate taken further physico-chemical Analysis of inorganic elements calcium and Magnesium used by Atomic Absorption spectrophotometer (AAS), sodium and potassium used by flame photometer, chloride used by Mohr's Method. Soil sample used by pH meter and Soil sample used by Electrical Conductivity.

Results and Discussion

The locality of studied sites was about 10-20 km in Baramati tehsil in number of hectare saline soil affected area guide also change in variation physicochemical properties salt affected soil showed pH was variation 8.9, 8.7 and 8.8 this indicates basic in nature soil. Salinity variation between 0.78 to 0.90 electrical conductivity (E.C.) as a unit dsm-1 of measured by E.C. Meter, value of parameter to high dur-

Table 1. Physico-chemical characteristics of rhizosphere saline soil of *Chenopodium album* L. from Baramati Tehsil, Dist.-Pune

Sr. No.	Physico chemical characteristics	Songaon /	Khandaj	Mekhali
1	PH	8.97±0.08	8.76±0.19	8.8±0.12
2	EC (dS.m-1)	0.90±0	0.78±0.06	0.85±0.02
3	Ca^{++} ppm	2803.33±190.38	3398.33±468.97	2811.66±88.71
4	Mg^{++} ppm	1081.66±102.75	1450±145.61	1302.66±109.54
5	Na^{++} ppm	7036.33±2639.71	1665.66±726.44	3402±318.16
6	Cl^{-} ppm	3483±2277.54	144±42.33	2470.66±718.36
7	K^{+} ppm	725.66±154.07	811.66 ±419.9	6532±611.44

(Mean ± S.D)

ing winter seasons to more in present sodium and chloride (Table 1) Na^{+} of Songaon sites is highest in compare to Khandaj and Mekhali and Cl^{-} also highest in Songaon as compare to Mekhali and Khandaj. Hights Na^{+} and Cl^{-} is directly impact on another beneficial ion like Ca^{++}, Mg^{++}, k^{+} ion. This study shows that rhizosphere of *Chenopodium album* L. has highest Na^{+}, Cl^{-} so its indicator of salinity.in result show that Na^{+} and Cl^{-} hight as compare to other.

Conclusion

This finding out also indicated physiochemical characteristics of saline soil three different sites from Baramati tehsil. Songaon, Khandaj and Mekhali region and indicates pH and E.C. high. saline soil in more dominant concentration present in sodium, chloride, calcium. Less dominant presence in Potassium and lowest dominant presence in Magnesium. The advises would be well cultivated plantlet in salinity soil from studies sites. They are suggested to farmer prevent of using number of chemicals, stop of high irrigation, drip and sprinkler irrigation system uses, saline soil using biofertilizers.

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Conflict of Interest - None

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