Preliminary communication

Effect of wastewater leakage from carbonate and bicarbonate factory on some soil quality parameters

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Abstract
Accident waste water seepage from carbonate and bicarbonate factory in East Azarbaijan affected about 700ha of arable land. This study was conducted to study effects of this event on soil properties. For this purpose in three topic zones (zone 1, zone 2, and zone 3 soil samples was prepared from two depth 0-30 cm and 30-60 cm. The results of chemical soil analysis showed that waste water seepage from this factory extremely increased electrical conductivity (EC), sodium adsorption ratio (SAR), concentrations of Cl^-, Ca^{2+} and Mg^{2+}, in soil for all three studied zones. All studied zones classified in saline soils even one of the zones (zone 1) was became sodicity. Whereas physical soil analysis showed that these characteristics showed no limitation for plant growth. Despite this, undesirable chemical condition in soil caused that elimination of vegetation and trees in polluted area.

Key words: leakage, carbonate, electrical conductivity, SAR, saline soil, sodic soil.

Introduction

Industrial waste water leakage is one of the most important soil and water pollutants in many parts of the world. Accurate discharge waste water of industrial factories for prevent of environmental pollutions is vitally and necessary (Kieth and Telliard, 1979). The rules that are ordered in vicinity of these factories in order to control contaminant levels must be applied indiscriminately by these factories (Kieth and Telliard, 1979). Sometimes, regardless to this problems by factories` ownerships leading to sully these areas and extinction of high status of agricultural lands. Example of this problem was happened in vicinity of the one of the carbonate and bicarbonate factories in East Azarbaijan state of Iran. Water waste leakage from this factory destroyed 700 ha of fertile agricultural lands and gardens in this area. Necessity of amendment these area and reclamation of these lands are essential and undeniable. Because of high width of polluted area and farmer unemployed in these zones Regardless to this problem may create economical instability and social- cultural difficulties. The objective of this study was to investigation effects of water waste leakage from this factory on chemical and physical soil characteristics in vicinity of factory.

Materials and Methods

In order to study of the effects of water waste leakage on soil characteristics in vicinity of carbonate factory in three topic zones (zone 1, zone 2, zone 3) from two depth of soil (0-30 and 30-60) samples were prepared. These samples were air dried and ground to pass through <2 mm sieve. And analyzed for chemical and physical properties. The electrical conductivity (EC_e), pH, Sodium adsorption ratio (SAR), C.C.E%, soil texture, O.C% and concentrations of HCO_3^-, Cl^-, SO_4^{2-}, Ca^{2+}, Mg^{2+} and Na^+.

Results

Results of soil chemical characteristics in experimental sites were summarized in Table 1. In all regions EC_e, High Concentration of chloride and sulfate anions and Ca^{2+} and Mg^{2+} cations are higher than plant tolerance in this area and act as limited factors for plant growth. The soils of polluted area classified as extremely saline soils. High ECe in these saline soils can by decreasing the osmotic potential and damage cell membrane of plants and remove them. High concentration of Above mentioned anions and cations are toxic, and by increasing the solute suction, reduce the availability of soil water to plants (Tisdal et al, 1993).

High concentration of Na^+ in depth 0-30 cm ,787.5 meq/l , and in surface crust 857.5 meq/l in region increase the alkaline risk. Future problems of this region will soil dispersion and decrease soil permeability and infiltration rates (Lauchli and Epstein, 1990). Soil texture had no limitation for crop production.

Investigation of polluted zones showed that content of pollution in this area is extremely high and improper selected situation for this industrial unit accompanied regardless to purify waste water in this factory damaged dramatically to farmers and settlement in these areas.

Table 1: Some chemical and physical soil characteristics in different depth at polluted zones

depth	EC_e	pH	C.C.E	O.C	Sand	Silt	Clay	HCO_3^-	Cl^-	SO_4^{2-}	Ca^{2+}	Mg^{2+}	Na^+	SAR
Cm	ds/m					%				meq/lit				
							Zone 1							
0-30	15.2	6.5	-	0.64	64	28	8	1.5	2130	433	1680	100	788	6
Crust	15.39	7.1	-	0.41	26	70	4	2.75	2206	320	1580	100	858	30
							Zone 2							
0-30	16	6.6	15.3	0.89	32	56	12	1.4	2520	320	1380	140	146	5.3
30-60	11.29	6.7	4.75	0.52	74	16	10	2.6	1420	87	1100	250	49	1.9
							Zone 3							
0-30	10.24	6.8	10	0.41	66	26	8	3.6	1330	642	920	1000	56.1	1.8
30-60	10.48	6.8	3.5	0.64	70	22	8	2.4	1170	89	960	120	51	2.2

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