Isolation and Identification of Halophytic Algae from Salty Soil Around Salt Lake of Turkey

Tahir Atici¹, Olcay Obali², Çengiz Akköz³ and Ayşê Elmaci⁴
¹Gazi Üniversitesi, Gazi Eğitim Fakültesi, Biyoloji Bölümü, 06500, Teknikokullar-Ankara
²Ankara Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, 06100, Tandoğan-Ankara
³Selçuk Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, 42000, Kampüs-Konya
⁴Uludağ Üniversitesi, Çevre Mühendisliği Fakültesi, 16000, Göörükle-Bursa

Abstract: In this study, algae were isolated from salty soils around Salt Lake. The algae, which were isolated and grown in BG-11 medium, were later identified. The correlation of algae with physical and chemical properties of soil were determined. The species of genera with a very high salt tolerance were Chroococcus, Nostoc, Phormidium, Lyngbya, Spirulina, Chlorella, Scenedesmus and Nitzschia.

Key words: Salty soil, halophytic algeae, Turkey

Introduction
Algae are organisms which have very wide spread areas. Their existence and tolerance in the soil is limited with medium sources (Metting, 1992). In this study, isolating from salty soil identified algae. It is though that this study as a basis for the studies that will be done later on salty soil algae. Working area includes the northwest region of Salt Lake. The region is completely dry and randomly encounter to plants live on soil.

Materials and Methods
From the region, on July 1999 and September 1999 samples were taken once from the selected four stations. When the samples were taken, from the part between the surface of soil and distance of 20 cm, with the help of small metal pipe, soil samples were taken. The samples were brought to laboratory and put into the petri dishes with diameter of 10 cm. Soil was wetted sufficiently with pipette and covered with lamella and put into the petri dishes with diameter of 10 cm. Samples were taken. The samples were brought to laboratory and put into the petri dishes with diameter of 10 cm. Soil was wetted sufficiently with pipette and covered with lamella and left under light for 24 hours for algae to do phototaxi motion. After that, algae that were taken from lamella by the help of inoculation loop; were put to the solid culture medium (BG 11) (Allen, 1968). Reproduction was observed in the tubes within fifteen days. Preperates of algae that were taken from the medium were prepared, identified and their photos were taken. For the identification the necessary resources (Prescott, 1975; Patrick and Reimer, 1966; Czarnecki and Blinn, 1978) were used. After that, by the help of micropipette again under the microscope the algae were isolated (Rippka, 1988) transferred to liquid B-11 were placed over white floresance, which gives light of 2000 lux. For the growth of algae at the room temperature without taking sunlight.

Results and Discussion
The physical and chemical analyses of sail were done in Soil and fertilizer Research Center of General Head office of Village services (Table 1). From the identification of the cultures that produces the study, 4, 3 and 6 genus were identified belonging to Bacillariophyta, Chlorophyta and Cyanophyta respectively. These genus genus are listed as systematically alphabetic below.

Cyanophyta: Anabaena macrospora Kebahn. (Fig. 1a) Prescott (1975), Page 517, Plate 117, Fig. 4-6. Trichomes planktonic, straight or flexous, solitary; somewhat ellipsoid 5-6.5 µm in diameter, 6-8 µm long; heterocysts spherical 6 µm in diameter.
Chroococcus varius A. Braun (Fig. 1b) Prescott (1975), (Page 451, plate 100, Fig. 15). An irregular shaped colony of 2-8 spherical cells inclosed by a hyaline, forming dark green or brownish moses on moist aerial substrates, cell contents blue-green or olive, not granular; cells 2-4 µm in diameter.
Lyngbya taylorii Drouet and Strickland. (Fig. 1c) Prescott (1975), page 503, Plate 113, Fig. 3). Filaments straight; trichomes very slightly tapering to the apices; cells 3-5 µm in diameter, filament 19 B24 µm in length.
Oscillatoria angusta Koppe (Fig. 1d) Prescott (1975), page 485, Plate 109, Fig. 7). Trichomes loosely entangled to form a thin plant mass, or solitary; not tapering toward the apex; apical cell bluntly rounded; cells 1-1.3, µm diameter, 6-8 µm long.
Phormidium agustissium W. et GS West (Fig. 1e) (Page 142, Fig. 124). Filaments forming a blue-green: with long cells. The last cells shorter and apex rarely straight, sometime becoming confluent with the mucilage of the plant mass; cells 0.6-1 µm in diameter, 2-5 µm long, cell contents finely granular.
Spirulina faxe G.M Smith (Fig. 1f) Prescott (1975), Page 479, Plate 108, Fig. 10) Trichomes loosely spiralled, forming a dark blue-green mass, 2-2.5 µm in diameter, distance between spirales 15-20 µm wide and spirales 4.6 µm wide.
Chlorophyta: Scenedesmus apolenis var. contaca Prescott (Fig. 1g) Prescott (1975), Page 279, Plate 63, Fig. 19-20). Colony consisting of 4 naviculoid cells arranged in asingle series, spines on terminal cells either 1 or 2 at each pole, long and curved; spines on apices of inner cells short and straight; cells 6.8 µm in diameter, 20-24 µm long.
S. telefri Defl (Fig. 1h) Uherkovich (1966), Page 146, Plate 10, Fig. 424-427). Colony twice generally, ovate or ovate Belipsoid cells, each cells with 2 spines; cells 6-8 µm wide and 10-16 µm long.
Chlorella vulgaris Bayernick (Fig. 1i) Prescott (1975), page 237, plate 53). Cells sphaerical, scattered among other algae or sometimes occuring in almost pure growths, chloroplast a parietal cup, sometimes without a pyrenoid; cells 10-14 µm in diameter.
Atici et al.: Isolation and identification of halophytic Algae from salty soil around salt lake of Turkey
Table 1: Some physical and chemical properties of salty soil around Salt Lake

<table>
<thead>
<tr>
<th>Properties</th>
<th>Value</th>
<th>Properties</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>0.20 cm</td>
<td>Mg</td>
<td>100.64 mg/l</td>
</tr>
<tr>
<td>NaCO₃</td>
<td>15.2%</td>
<td>Na</td>
<td>893.75 mg/l</td>
</tr>
<tr>
<td>P₂O₅</td>
<td>1.55 kg/d</td>
<td>K</td>
<td>11.62 mg/l</td>
</tr>
<tr>
<td>Organic Material</td>
<td>1.58%</td>
<td>CO₂</td>
<td>---</td>
</tr>
<tr>
<td>Dampness</td>
<td>5.51%</td>
<td>HCO₃</td>
<td>3.41 mg/l</td>
</tr>
<tr>
<td>Satiation to water</td>
<td>68.81%</td>
<td>CL⁻</td>
<td>74.75 mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>9.56%</td>
<td>SO₄</td>
<td>895.31 mg/l</td>
</tr>
<tr>
<td>EC</td>
<td>97.7 ds/m</td>
<td>K⁺</td>
<td>11.62 mg/l</td>
</tr>
<tr>
<td>Organ. Material</td>
<td>15.2%</td>
<td>Na</td>
<td>893.75 mg/l</td>
</tr>
<tr>
<td>Satiation to water</td>
<td>68.81%</td>
<td>CL⁻</td>
<td>74.75 mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>8.56%</td>
<td>SO₄</td>
<td>895.31 mg/l</td>
</tr>
<tr>
<td>EC</td>
<td>97.7 ds/m</td>
<td>K⁺</td>
<td>11.62 mg/l</td>
</tr>
</tbody>
</table>

**Bacillariophyta:** *Cymbella affinis* Kiitz. (Fig. 1j) (Patrick and Reimer (1966), page 614-615, plate 58 Fig.6) Valve 22-40 µm length by. 7-13 gill breadth, striae 8-10 in 10 µm. *Gomphonema lanceolatum* Kutz. (Fig. 1k) (page 49, plate 35, Fig. 2-5) Valve 35-40 µm length by, 7-8 um breadth, striae 10-11 in 10 µm. *Nitzschia vermicularis* (Fig. 1l) (Kütz.) Grun. (page 240, plate 813) Valve 86-100 µm length by, 7-10 µm breadth, fibulae 9-10 and striae 25-26 in 10 µm. *Synedra ulna* (Nitz.) Ehr. (Fig. 1m) (Czarneckii and Blinn, 1978, page 37, plate 8, Fig. 3) Valve 140-160 µm length by, 6-8 µm breadth, striae 9-10 in 10 µm.

These identified species, especially from the point of view dissolved ions (Ca²⁺ 57.46 mg/l, Mg²⁺: 100.64 mg/l, Na⁺²: 893.75 mg/l and K⁻ 11.62 mg/l) and Cations (HCO₃⁻: 3.41 mg/l, Cl⁻² :74.7 mg/l and SO₄²⁻: 985.31 mg/l) shows tolerance to high values. This shows that these species are adapted to salty media. Being the species of Cyanophyta in excess and pH values light alkaline shows that individuals belonging to this division may be widespread in salty media.

The individuals belonging to Bacillariophyta are less developing than other divisions in BG-11 medium which was observed (Starr, 1978).

Furthermore, it was observed from the study that were done with the sample taken from kurşunlu waterfall (Gonul et al., 1997) that all *Scenedesmus* species grow in BG-11 medium and from Ceonobia.

**References**


