

DIVERSITY OF THE GENERA OF CHLOROPHYTA IN FRESH WATERS OF
DISTRICT SWAT N.W.F.P PAKISTAN

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Abstract

Fifty six genera of green algae were collected from ten different localities of District Swat, belonging to 25 families and 9 genera of Chlorophyta from December 2006 August 2008. Family Oocystaceae with 39 species was most commonly found, next to it were families Scenedesmaceae with 18 species and Desmidiaceae with 14 species. The genera Oocystis and Tetraedron were represented by 10 species and Cosmarium with 7 species occurred most commonly. Among the recorded genera 13 (23.2%) were Unicellular, 25 (44.6%) were Colonial, 9 (16.7%) were Unbranched filamentous, 4 (7.1%) were branched filamentous, 1 (1.7%) was Pseudofilamentous, 1 (1.7%) was Mesh-like, 2 (3.5%) were Heterotrichous and 1 (1.7%) was with Irregular amorphous thallus. Highest proportion of Chlorophycean members was recorded from Kanju area 89 and lowest was recorded from Kalam 69.

Introduction

The Valley of Swat a part of Malakand Division covers 5737 square kilometers (estimated). The elevation of the valley is 630 to 3000m above sea level. Swat is located at a distance of 170 km from Peshawar and 270 km from Federal capital of Islamabad. Faridi (1971) recorded some genera of fresh water algae from Pakistan and Azad Kashmir. Leghari *et al.*, (2001) reported 46 species of Chlorophycean members belonging to order Chlorococcales from Sindh. Reshmi (2004) conducted a detailed study on Chlorophycean biodiversity in Wet lands on Satna (M.P.) India. The study revealed 32 genera and 52 species belonging to 18 families and 7 orders of Chlorophyceae, which were recorded from different wet lands of Satna. Kumar & Rai (2005) recorded 13 taxa of Chlorophyceae from Namchi, Sikkim-Himalayas. Misra *et al.*, (2005) worked on some fresh water algae of Eastern Uttar Pradesh, India. Their communication deals with morpho-taxonomic description of 11 fresh water algae belonging to class Chlorophyceae and Bacillariophyceae. Sarim and Zaman (2005) carried an extensive study and a total of 89 species belonging to 31 genera of Chlorophyceae, Bacillariophyceae, Xanthophyceae and Cyanophyceae, were recorded from various localities of District Charsadda. Zarina *et al.*, (2005) worked on Green algae and made large collections from various Districts of Punjab. Tiwari and Chauhan (2006) studied the seasonal phytoplanktonic diversity of Kitham Lake, Agra. Their collections were dominated with Chlorophycean members. Zarina *et al.*, (2009) described 22 genera and 127 species of Green algae from Punjab and neighboring areas of Pakistan. The recent report of algal species diversity was reported in Swat by Ali *et al.*, 2010 and 2010a.

Materials and Methods

Algal collections were made during December 2006 to August 2008 from various localities of District Swat. The specimens were identified with the help of authentic literature (Smith, 1950; Prescott, 1961; Siddiqi & Faridi, 1964; Tiffany & Britton, 1971; Akiyama & Yamagishi, 1981).

Results and Discussion

Fifty six genera containing 138 species belonging to 25 families and 9 orders have been collected from various fresh water habitats. Collected algal members were identified up to species level. (Tables 1-2).

1. Taxonomic diversity: Chlorophyta was represented by 9 orders, 25 families, 56 genera and 138 species. Family Oocystaceae was represented by 12 genera, Palmellaceae and Volvocaceae by 5 genera each, Scenedesmaceae, Cladophoraceae and Zygnemataceae by 3 genera each, Dictyosphaeriaceae, Hydrodictyaceae, Oedogoniaceae, Tetrasporaceae, Ulotrichaceae and Cosmarieae by 2 genera each, while Chlorococcaceae, Characiaceae, Chaetophoraceae, Chaetosphaeridiaceae, Coleochaetaceae, Sphaeropleaceae, Cocomaxaceae, Microsporaceae, Cylandrocapsaceae, Haematococcaceae and Desmidiaceae/Closterieae were represented by 1 genera each.

2. Thallus diversity: Among the recorded 56 Chlorophycean genera 13 (23.21%) were Unicellular forms, 25 (44.64%) were belonging to Colonial types, 9 (16.07%) were Unbranched Filamentous forms, 4 (7.14%) were Branched Filamentous thalli, 2 (3.57%) were those belonging to Heterotrichous thalli, while Pseudofilamentous, Mesh-Like thallus and Anastomosing thallus were recorded as 1 (1.78%) genera each.

3. Diversity of localities: Collections were made from 10 different localities of Swat District. During present study highest proportion of Chlorophycean members was recorded from Kanju 89 (64.49%). It was followed by Kabal 86 (62.31%), Aligrama 85 (61.59%), Matta 74 (53.62%), Khwaza Khela 73 (52.89%), Madian and Bahrain 70 (50.72%) each. Lowest number was that of Kalam 69 (50.00%).

4. Seasonal variation: Collections were made during all seasons, i.e., summer, autumn, winter and spring. Highest number of Chlorophycean members was recorded during summers and autumn. Winters displayed comparatively low Chlorophycean diversity. As we know that winters are a bit harsh in upper Swat region and are accompanied with heavy snowfall and hail storms so most of the Green algal members form resistant spores and parenting bodies to tide over the winters.

Simpson’s Diversity Index (D): The Simpson’s Index (D) measures the probability that two individual randomly selected from a sample will belong to the same species. The Simpson’s Index (D) is defined as:

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

where n = Total number of organism of a particular species
and N = total number of organism of all species
The value D will always lie between 0 and 1
0 represent infinite diversity & 1 represent no diversity
The larger the value of D the lower will be diversity

Table: Diversity index for families of Chlorophyta in District Swat.		
Order	Family	D
Chlorococcales	Oocystaceae	0.0420
	Chlorococcaceae	0. 0022
	Dictyosphariaceae	0.0044
	Characiaceae	0.0047
	Coelastraceae	0.0038
	Hydrodictyaceae	0.021
	Scenedesmaceae	0.014
Cladophorales	Cladophoraceae	0.011
Chaetophorales	Chaetophoraceae	0.0006
	Chaetosphaeridiaceae	0.0006
	Coleochaetaceae	0.0022
Sphaeropleales	Sphaeropleaceae	0.0006
Oedogoniales	Oedogoniaceae	0.0077
Tetrasporales	Palmellaceae	0.008
	Cocomaxaceae	0.0022
	Tetrasporaceae	0.0066
Ulotrichales	Ulotrichaceae	0.0157
	Microsporaceae	0.0001
	Cylindrocapsaceae	0.0006
Volvocales	Chlamydomonadaceae	0.0090
	Haematococcaceae	0.0001
	Volvocaceae	0.0081
Zygnematales	Desmidiaceae/ Closterieae	0.0122
	Cosmarieae	0.0145
	Zygnemataceae	0.0161

CONVOLVULUS SCINDICUS: CONSERVATION ASSESSMENT AVOIDING EXTIRPATION

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