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OCCURRENCE OF VARIOUS DIATOM SPECIES OF GENUS NITZSCHIA HASSAL FROM JAMMU REGION

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ABSTRACT
A Study of *Nitzschia* species was done from 33 spots in Jammu province of Union Territory of J&K. Occurrence and distribution of different species in different habitats was studied. The 33 water bodies scanned covered 5 districts of Jammu province and the spots represent different habitats viz. Streams, ponds, lakes, ditches, irrigation canals. From these spots 31 species of *Nitzschia* were collected. Various shapes of *Nitzschia* were collected from these water bodies. Collections were made irregularly from different habitats during the period of present studies(Nov 2002 to March 2004).Water samples collected from different habitats were also analysed with respect to various physicochemical parameters, temperature and pH. Out of 31 species of *Nitzschia* 15 have been collected from Lentic, 19 from Lotic water bodies and 3 were common to both. Of all the species collected only one species was acidophilic and rest all the species were alkalibionate. Most of the water bodies scanned were alkaline and carbon dioxide- carbonate and bicarbonate system operated in these water bodies.

KEY WORDS: Lotic waters, Lentic waters, *Nitzschia,* Alkalibionate, planktonic Introduction

INTRODUCTION

Survey and enumeration of *Nitzschia* species was done from various water bodies of jammu region. Hassal in 1845 first described the genus *Nitzschia*. It has been classified differently by different authors depending on its characteristic features i.e structure, nature of pigments, reserve food material and method of reproduction. Fritsch (1977) classified genus *Nitzschia* under family Nitzschoideae. Simonsen (1972) included *Nitzschia* under the family Bacillariaceae but Smith(1994) again placed *Nitzschia* under family Nitzschoideae. Round et al (1990) on the basis of Scanning electron microscopic technique described *Nitzschia* under the family Bacillariaceae. Nitzschia constitutes basic component in the food chain of aquatic organisms as it is an ecological indicator. It also produces neurotoxin domoic acid (subbarao et al.1991). Species were identified, Scanning electron microscopic studies were also done on certain species. Occurrence and distribution of different species occurring in different habitats were studied.

MATERIAL & METHODS

Collection of material was carried out from different habitats such as pools, ponds, ditches, streams, rivers, rocks, agricultural fields and lakes of jammu province of j& K. Planktonic forms of *Nitzschia* have been collected using planktonic nets. After removing epilithic and epiphytic forms from pebbles, stones, rocks, submerged parts of aquatic plants they were transferred to laboratory. Samples were finally transferred into collection bottles and labelled for further studies. Cleaning of specimens have been done following Brun's method(Sarode& Kamat,1984). After cleaning and mounting,the line drawings of original *Nitzschia* specimens have been drawn using camera lucida (prism type make Japan) after micro photography, SEM studies identification of diatoms was done using relevant standard literature.Observations on occurrence, habit, distribution of various *Nitzschia* species in different habitats have been recorded. Frequencies of various species as well as associated algae have been calculated. Water samples from different spots were analysed for various physicochemical parameters. Temperature of surface water was recorded with a standard centigrade mercury thermometer, pH was recorded with the help of field pH meter pocket type and reconfirmed in the labratory.

RESULTS AND DISCUSSION

Observations on occurrence, habit, habitat and distribution of various *Nitzschia* species in different habitats have been recorded. *Nitzschia* from the selected 33 water bodies of Jammu region was represented by 31 species. Out of the 31 species, 15 were collected from Lentic, 19 from Lotic and 3 were common to both. Interestingly water bodies of Jammu region were observed to exhibit remarkable diversity in terms of species of *Nitzschia* both quantitatively and qualitatively.

The maintenance of *Nitzschia* in presently studied water bodies of jammu depends upon certain factors such as density dependent and density independent factors i.e light, temperature and rate of flow of water effected the diatom communities considerably. One of the most most important factor influencing the types of species present in the stream as recognised by Ruttner(1940) and Kolbe(1932) is the speed of current. During the present course of studies species like *Nitzschia heufleriana, Nitzschia amphibia, Nitzschia perminuta,Nitzschia philippinarum, Nitzschia subacicularis, Nitzschia communis*, and *Nitzschia acicularis* were observed to preffer fast running water habitats (mostly streams) whereas *Nitzschia pseudofonticola, Nitzschia ignorata* krasske, *Nitzschia lorenziana* var.

subtilis, Nitzschia sinuata var. *denticuloides, Nitzschia holsatica, Nitzschia sinuata* var. *tabellaria, Nitzschia aerophiloides, Nitzschi*a *subinflata, Nitzschia sigma* Kutz. were collected exclusively from slow running streams. *Nitzschia amphibian* Gurnow and *Nitzschia sinuata* var. *tabellaria* occupied both slow moving and fast running streams.(Table1)

The second important density independent factor influencing the growth of *Nitzschia* was the light. The amount and duration of light are remarkable factors influencing the growth of Diatoms. The optimum requirement of light varies from species to species and habitat to habitat. According to Shroeder(1939) the diatoms which preferred abundant light were usually the planktonic and preffered to inhabit shallow littoral zones. During the course of present studies all the species of *Nitzschia* have been observed to be planktonic(Table1) and had been collected from the shallow zones of littoral regions of all the habitats especially during the summer months. This indicates that *Nitzschia* preferred bright light along with longer light duration.

Another important factor influencing the growth of *Nitzschia* is the temperature . Temperature plays an important role effecting the growth of diatoms directly or indirectly. Certain species like *Nitzschia dissipata, Nitzschia thermalis* var. *capitata* exhibit a narrow range of temperature tolerance in comparison to *Nitzschia palea, Nitzschia sinuata* var. *tabellaria*, inhabited habitats experiencing wide range of water temperature(Table2). Werner(1977). stated that number of diatom species decreased qualitatively and quantitatively when the water temperature exceeded on either side of the optimum limits. During the present study the maximum number of *Nitzschia* species have been recorded from water bodies exhibiting a range of 10-26 °C temperature.(Table2)

Maximum of *Nitzschia* sp. Occurred at high altitude preferring low temperatures. Maximum number of *Nitzschia* species existed within pH range 7.5 to 8.5.(Table2) 23 species of *Nitzschia* occurred in this range.

With increase in altitude Free Co2 in water increase and as a result number of *Nitzschia* sp. in these waters also increases but as such no direct correlation could be derived.

Associations of *Nitzschia* with other algal groups were studied and it was found that it showed maximum associations with Bacillariophyceae followed by Chlorophyceae and then Cyanophyceae. Table1: Occurrence of various species of Nitzschia in Lentic and Lotic waters and their habit

TABLE1: Occurrence of various species of Nitzschia in Lentic and Lotic waters and their habit

S.No	Name of species	Water source		Habit	
		Lentic	Lotic	Epiphytic	Planktonic
1	*Nitzschia aerophiloides*	+	_	_	+
2	*N. amphiboides*	_	+	_	+
3	*N. amphibia*	_	+	+	_
4	*N. bacata*	_	+	_	+
5	*N. clausii*	+	_	+	_
6	*N. communis*	_	+	_	+
7	*N. denticula*	+	_	_	+
8	*N. dissipata*	_	+	+	_
9	*N. fasciculata*	+	_	+	_
10	*N. filiformis*	+	_	+	_
11	*N. heufleriana*	_	+	+	_
12	*N. holsatica*	+	_	_	+
13	*N. ignorata*	_	+	+	_
14	*N. intermedia*	+	_	_	+
15	*N. linearis*	_	+	+	_
16	*N. lorenziana*	_	+	+	_
17	*N. microcephala*	_	+	_	+
18	*N. palea*	+	+	_	+
19	*N. perminuta*	+	+	+	+
20	*N. philippinarum*	_	+	_	+
21	*N. pseudofonticola*	_	+	_	+
22	*N. recta*	+	_	+	_
23	*N. sigma*	_	+	_	+
24	*N. sinuata var.tabellaria*	+	_	+	+
25	*N. sinuata var.denticuloides*	+	_	_	+
26	*N. spiculoides*	+	_	+	_
27	*N. spiculum*	_	+	_	+
28	*N. subacicularis*	+	_	+	_
29	*N. subinflata*	_	+	_	+
30	*N. thermalis var.capitata*	+	+	_	+
31	*N. vitrea*	_	+	_	+

TABLE 2: Temperature and pH of water source in which different species were collected.

S.NO	Name of Species	Temperature in °C	PH
1	*Nitzschia aerophiloides*	18	8.6
2	*N. amphiboides*	18	8.6
3	*N. amphibia*	23	8.0
4	*N. bacata*	23	8.0
5	*N. clausii*	17	7.9
6	*N. communis*	12	8.4
7	*N.denticula*	19	8.2
8	*N. dissipata*	16,19	7.2,8.2
9	*N. fasciculata*	19	8.2
10	*N. filiformis*	17	7.9
11	*N. heufleriana*	14.1	6.8
12	*N. holsatica*	18	8.6
13	*N. ignorata*	21	7.8
14	*N. intermedia*	25	8.2
15	*N. linearis*	11.5,25	7.9,8.8
16	*N. lorenziana*	21	7.8
17	*N. microcephala*	19	7.8
18	*N. palea*	25,21,22,12	8.2,7.8,7.7,8.4
19	*N. perminuta*	21	8.4
20	*N. philippinarum*	21	8.4
21	*N. pseudofonticola*	18	8.6
22	*N. recta*	19	8.2
23	*N. sigma*	10	8.1
24	*N. sinuata var. tabellaria*	19,10,18	8.2,8.1,8.6
25	*N. sinuata var. denticuloides*	12	8.4
26	*N. spiculoides*	25	8.2
27	*N. spiculum*	18	8.6
28	*N. subacicularis*	23	8.0
29	*N. subinflata*	18	8.6
30	*N. thermalis var. capitata*	22,24	7.8,8.0
31	*N. vitrea*	24	8.0

CONCLUSION

Present studies prove that *Nitzschia* preferred lentic habitats as compared to lotic ones. Streams of higher altitudes showed maximum number of species of *Nitzschia*.Most of the species are alkalibionate and *Nitzschia* showed maximum association with Bacillariophyceae followed by Chlorophyceae and cyanophyceae.

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