

Original Research Article

Aquatic Algae from Kaziranga National Park, Assam, India

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ABSTRACT

Keywords

Kaziranga National Park (KNP), Aquatic Algae *Rhinoceros unicornis*

Kaziranga National Park (KNP) is a World Heritage site and one of the largest tracts of protected land in the sub-Himalayan belt. Though various studies have been done on tree and herbaceous plants, micro-floral diversity in KNP is yet to be explored. The present investigation is an attempt to record algal diversity from aquatic habitat in two Range areas following proper methodology of collection of samples and identification procedures. All together 91 species of algae are found belongs to the family Chlorophyceae, Bacillariophyceae and Cyanophyceae among which 89 algae species are new report from this protected area. The result of this study gives information about algal flora that may be added to the list of plants in KNP.

Introduction

Kaziranga National Park (KNP) was set in 1908 primarily to save the one horned Rhinos (*Rhinoceros unicornis*) and given National Park status in 1974. The park was named as a World Heritage site in 1985. Kaziranga is one of the largest tracts of protected land in the sub-Himalayan belt, and due to the presence of highly diverse and visible species, has been described as a "biodiversity hotspot". Various studies have been done on tree plants, herbaceous plants and habitats apart from animals. But micro-floral diversity is yet to be explored at satisfactory level. This is reason why this present investigation is taken into account. There are prospects of research on the most pertinent aspects of systematic and

taxonomy of freshwater algae that are relevant to inventorying, mapping and monitoring biodiversity for long-term conservation, management and sustainable utilization.

Materials and Methods

Study Sites

KNP is located between latitudes 26⁰30' N and 26⁰45' N and longitudes 93⁰08' E and 93⁰36' E in Assam, the North Eastern region (NER) of India (Figure). The study sites are selected from Kaziranga Range and Burapahar Range of KNP. Aquatic habitats are selected from both lotic and lentic

habitats. The lentic or stagnant water bodies are in form of beels, pools and ditches and lotic or flowing in form of Nallah and river. A total of 33 numbers of samples are collected randomly from the study area.

Collection

Samples are collected from stagnant water bodies as well as flowing water bodies. Samples are collected in wide-mouth bottle from the water surface dipping the bottle mouth into the water. One sample is fixed with 3 ml Lugol's iodine (as standard is about 0.3 ml per 100 ml sample) solution at the spot and another is carried to the laboratory as it is for isolation purpose.

Isolation

Isolation of algae is done following serial dilution method (Vincent 1970). Different types of culture media are used for isolation of algae such as Bold Basal, BG₁₁, Chu 10, Fogg's, Volvox medium, Desmidium medium, Spirulina medium, Soil-water medium (Andersen 2005) etc. Enrichment cultures are raised from the collected samples by incubation at $\pm 28^{\circ}\text{C}$ for 20-40 days for proper growth of algae for identification in the Phycology Research laboratory of Nowgong College.

For isolation of unialgae, different dilutions are prepared from enrichment culture. Inoculums from each dilution (preferably from 10^{-3} and 10^{-4}) are streaked in solid media contained in sterile Petri-plates. The plates are incubated for 10-15 days until individual colonies appeared on the surface. Each colony represented a unialgal culture. The individual colonies are picked up and transferred to liquid medium in flasks. The flasks are incubated in culture racks for multiplication and further taxonomical study.

Identification

Macro algae are directly identified with the help of relevant literature. After collection macroalgal samples are repeatedly washed with fresh and distilled water. For microalgae, Isolation and morphological details of samples are done using research microscope, photographs and measurement as discussed by John et al. (2011) and Andersen (2005).

Taxonomical analysis of both micro and macro algae are done with the help of cited literatures and monographs of Prescott (1951, 1954, 1976); Desikachary (1959, 1987b); Philipose (1967); Iyengar and Desikachary (1981); Gonzalves (1981); Anand (1988); Wehr and Sheath (2003); Jena et al. (2006a, 2006b); Rath et al. (2006) Jena and Adhikary (2007); Coesel and Meesters (2007); Misra et al. (2008); Dwivedi et al. (2009); John et al. (2011); Yasmin et al. (2011); Arulmurugan et al. (2011) and Buragohain et al (2012).

Results and Discussion

The algae recorded are mainly from three classes i.e Chlorophyceae, Cyanophyceae and Bacillariophyceae. Chlorophycean algae are prevalent particularly the group desmids along with Chlorococcales members (Plate). All Euglenoids are found in aquatic habitats forming blooms. Filamentous and colonial forms of Cyanophyceae are recorded from both lentic and lotic habitat. Bacillariophyceae members or Diatoms are found from collected surface water and muddy soil of beels.

All together 91 numbers of algae comprising of 59 members of Chlorophyceae, 15 members of Bacillariophyceae and 17 members of Cyanophyceae are recorded from Kaziranga range and Burapahar range

of Kaziranga National Park. A total number of 89 algal species are newly reported from this protected area while two species namely *Hydrodictyon reticulatum* and *Ankistrodesmus falcatus* are reported earlier from KNP (Jena and Adhikary 2007). The algae found in aquatic habitat of KNP are given in the following Table.1. The result of present investigation shows Kaziranga National Park harbours diverse class of algae in various habitats. Secrete of their

wide range of distribution lies in their photoautotrophic nature with an ability to fix nitrogen of the atmosphere and use it for their growth and development (Carr and Whitton 1982). Algae is primary producer in food chain. The present study is only an approach to explore aquatic algae of KNP. From this investigation, we realize that there is an utmost need to explore algal flora more elaborately from all types of habitat in Kaziranga National Park.

Table 1 Algae Recorded in Kaziranga Range and Burapahar Range of Kaziranga National Park, India

Name of Class	S.No.	Name of Species
Chlorophyceae	1.	<i>Ankistrodesmus falcatus</i> (Corda) Ralfs
	2.	<i>Ankistrodesmus fusiformis</i> (Corda ex Korshikov)
	3.	<i>Ankistrodesmus faciculatus</i> (Lundberg) Komarkova-Legnerova
	4.	<i>Ankistrodesmus spiralis</i> (W.B. Turner) Lemmermann
	5.	<i>Bracteacoccus minor</i> (Chodat) Petrova
	6.	<i>Bulbochaete nana</i> (Wittrock)
	7.	<i>Characium ambiguum</i> (Hermann)
	8.	<i>Chaetophora attenuate</i> (Hazen)
	9.	<i>Chara fragilis</i> (Desvaux)
	10.	<i>Chlorella minutissima</i> (Fott et Novakova)
	11.	<i>Cladophora glomerata</i> (Linnaeus) Kutzing
	12.	<i>Closterium ehrenbergii</i> (Ralfs)
	13.	<i>Closterium incurvum</i> (Brebisson)
	14.	<i>Closterium kuetzingii</i> (Brebisson)
	15.	<i>Cosmarium auriculatum</i> (Reinsch)
	16.	<i>Cosmarium baccatum</i> (Turner)
	17.	<i>Cosmarium bidentatum</i> (Turner)
	18.	<i>Cosmarium ovllatum</i> (Ralf)
	19.	<i>Crucigenia tetrapedia</i> (Kirchner) West et G.S.West
	20.	<i>Desmodesmus communis</i> (E.Hagewald) E.Hagewald
	21.	<i>Euastrum ceylanicum</i> (W. et GS West)
	22.	<i>Euastrum spinulosum</i> (Delponte)
	23.	<i>Eudorina elegans</i> (Ehrenberg)
	24.	<i>Euglena gracilis</i> (G.A.Klebs)
	25.	<i>Euglena polymorpha</i> (P.A.Dangeard)
	26.	<i>Hydrodictyon reticulatum</i> (Linnaeus) Lagerheim
	27.	<i>Klesbormidium fluitans</i> (F.Gay) Lokhorst
	28.	<i>Merismopedia tenuissima</i> (Lammermann)
	29.	<i>Micrasterias ceratofera</i> (Josh)
	30.	<i>Micrasterias thomasiana</i> (W.Archer)
	31.	<i>Micrasterias apiculata</i> (Ralfs)
	32.	<i>Micrastearis incisa</i> (Brebisson)
	33.	<i>Micrasterias zeylanica</i> (Fritsch)
	34.	<i>Oedogonium brasiliense</i> (Borge)
	35.	<i>Pediastrum angulosum</i> (Ehrenberg ex Meneghini)
	36.	<i>Pediastrum boryanum</i> (Turpin) Meneghini
	37.	<i>Pediastrum tetras</i> (Ehrenberg) Ralfs

	<ol style="list-style-type: none"> 38. <i>Phacus caudatus</i> (K.Hubner) 39. <i>Phacus helikoides</i> (Pochmann) 40. <i>Pithophora oedogonia</i> (Montagne) Wittrock 41. <i>Rhizoclonium hieroglyphicum</i> (Kutzing) 42. <i>Scenedesmus arcuatus</i> (Lammermann) Lammermann 43. <i>Scenedesmus dimorphus</i> (Kützing) 44. <i>Scenedesmus quadricauda</i> (Turpin) 45. <i>Scenedesmus serratus</i>(Corda) 46. <i>Sorastrum americanum</i> (Bohlin) Schmidle 47. <i>Spirogyra communis</i> (Hassall) Kutzing 48. <i>Spirogyra paradoxa</i> (Rao) 49. <i>Staurastrum gracile</i> (Ralfs) 50. <i>Staurastrum senarium</i> (Ehrenberg; Ralf) 51. <i>Staurastrum setigerum</i> (Cleve) 52. <i>Staurastrum trifidum</i> (Nordest) 53. <i>Staurastrum wildmanii</i> (Gutw) 54. <i>Synura peterseni</i> (Korshikov) 55. <i>Trachelomonas superba</i> (Svirenko <i>emend.</i> Deflandre) 56. <i>Ulothrix zonata</i> (F.Weber <i>et</i> D.Mohr) Kutzing 57. <i>Volvox aureus</i> (Ehrenberg) 58. <i>Westella botryoides</i> (West) De Wildeman 59. <i>Zygnema khannae</i> (Skuja)
Bacillariophyceae	<ol style="list-style-type: none"> 1. <i>Amphora ovalis</i>(Kutzing) 2. <i>Cymbella gracilis</i>(Ehrenberg; Kutz) 3. <i>Cymbella turgidula</i>(Grunow) 4. <i>Docidium undulatum</i> (Bailey) 5. <i>Gomphonema lanceolatum</i> (Ehrenberg) 6. <i>Gyrosigma acuminatum</i> (Kutzing) Rabenhorst 7. <i>Grammatophora undulate</i> (Turner) 8. <i>Navicula major</i> (Kutzing) 9. <i>Navicula microspora</i> (Kant <i>et</i> Gupta) 10. <i>Navicula gracilis</i> (Ehrenberg) 11. <i>Netrium digitus</i> (Ralfs) Itzigsohn <i>et</i> Rothe 12. <i>Pinnularia gibba</i> (Ehrenberg) 13. <i>Selenastrum gracile</i> Reinsch 14. <i>Surirella robusta</i> (Ehrenberg): 15. <i>Tetraedron tumidulum</i> (Reinsch)
Cyanophyceae	<ol style="list-style-type: none"> 1. <i>Anabaena circinalis</i> var. <i>crassa</i> (Ghose) 2. <i>Anabaena orientalis</i> (Dixit) 3. <i>Anabaena verrucosa</i> Boye-Petersen 4. <i>Aphanocapsa koordersi</i> (Strom) 5. <i>Aphanothece naegelii</i> (Wartm) 6. <i>Chroococcus minor</i> (Kutzing) Nageli 7. <i>Chroococcus turgidus</i> (Kutzing) Nageli 8. <i>Lyngbya majuscula</i> [Harvey in Hooker] <i>ex</i> Gomont 9. <i>Nostoc muscorum</i> C.Agardh 10. <i>Nostoc piscinale</i> [Kutzing] <i>ex</i> Borner <i>et</i> Flahault 11. <i>Nostochopsis lobatus</i> (Wood <i>em.</i> Geitler) 12. <i>Oscillatoria princeps</i> [Vaucher] <i>ex</i> Gomont 13. <i>Phormidium tenue</i> [Meneghini] Gomont <i>ex</i> Gomont 14. <i>Scytonema hofmanni</i> (C. Agardh; Bornet) 15. <i>Scytonema simplex</i> (Bharatdwaja) 16. <i>Spirulina princeps</i> (West & West) 17. <i>Westiellopsis prolifica</i> (Janet)

Chlorophyceae = 59; Bacillariophyceae = 15; Cyanophyceae= 17; Grand Total = 91

Figure.1 Location of Kaziranga National Park, India

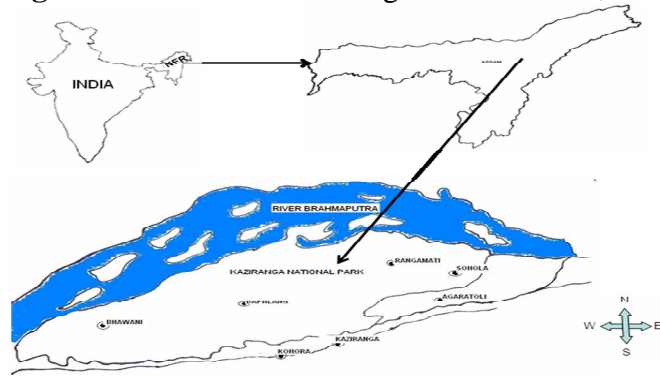
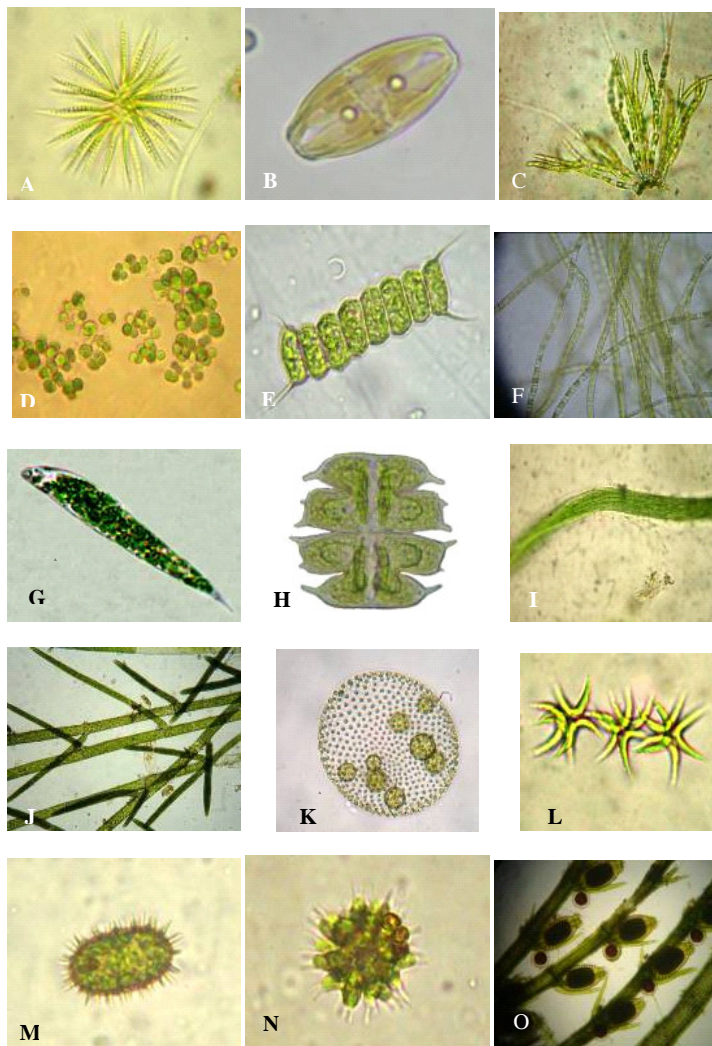


Plate Some Newly Reported Algae from Kaziranga National Park



A *Ankistrodesmus spiralis*
 D *Chroococcus minor*
 G *Euglena gracilis*
 J *Pithophora oedogonia*
 M *Trachelomonas superba*

B *Amphora ovalis*
 E *Desmodesmus communis*
 H *Micrasterias zeylanica*
 K *Volvox aureus*
 N *Sorastrum americanum*

C *Chaetophora attenuate*
 F *Klesbormidium fluitans*
 I *Microcoleus chthonoplastes*
 L *Selenastrum gracile*
 O *Chara fragilis*

Acknowledgement

Authors are grateful to Ministry of Environment and Forest, Govt. of India for financial assistance and Ministry of Environment and Forest, Govt. of Assam for providing necessary permission for the investigation. Appreciation is extended to the field staff of Kaziranga National Park for timely academic support in sample collections. Authors also acknowledge Department of Biotechnology, Govt. of India for the facility available in Institutional level biotech hub at Nowgong College.

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