

## ***Scenedesmus* and related genera in riverine system of Chandrapur district, Maharashtra, India.**

**B. Malleesh Reddy<sup>1</sup> and A. Chaturvedi<sup>2</sup>**

<sup>1</sup>Shree Shivaji Arts, Commerce and Science College, Rajura, Dist. Chandrapur. Maharashtra, India.

<sup>2</sup>PGTD of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Ravindaranath Tagore Marg, Nagpur 440001, India

### **Abstract**

*Scenedesmus* is most common and diversified genus in Indian water bodies. This genus is currently divided in to several new genera. The present study is a detailed account of *Scenedesmus* and related genera from three major rivers of Chandrapur district. Total twenty seven taxa of twenty species were identified and explained. It also includes one new variety of *Scenedesmus smithii*.

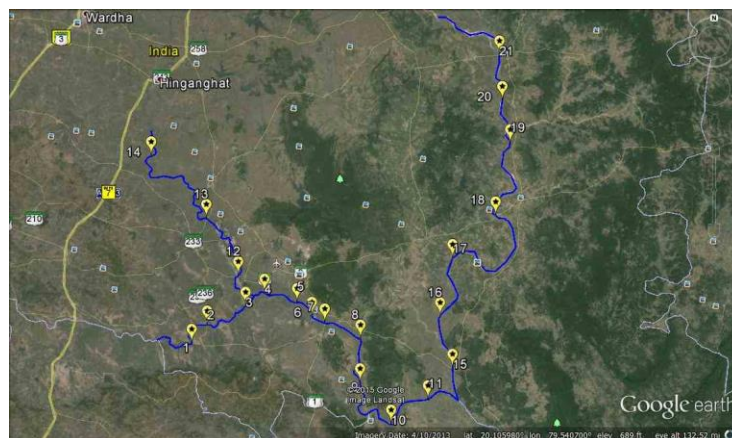
**Key words:** Chandrapur, Riverine system, *Scenedesmus*

### **Introduction**

Chandrapur is the easternmost district of the Maharashtra state, located between 18° 41' to 20° 50' north latitudes and 78° 48' to 80° 55' east longitudes . The district is bounded by Nagpur, Bhandara and Wardha on the northern side, Yavatmal on the western side, Gadchiroli on the eastern side and Adilabad district of the Telangana on the southern side (fig. 1).



Location Map



Site Map

It occupies an area of 10,655 sq. km which constitutes 3.72% of the total area of the state and had population of 21,94,262 (population census, 2011). Chandrapur is known for its hot climatic condition which ranges between minimum 11.6<sup>0</sup> C in December and maximum 49<sup>0</sup> C in May. According to the temperature records of 2009, the temperature of Chandrapur has crossed 51<sup>0</sup>C in the month of May. In severe heat conditions, the temperature is among the highest temperatures in the South Asian region. The average annual rainfall is about 1420 mm. The eastern part receives more rainfall than the west. The average number of rainy days is 60 to 65 throughout the district. The relative humidity is very high during monsoon season, which exceeds 70%, but after monsoon season it goes down rapidly and in summer it is only 20%.

The entire area of the district falls in the Godavari basin. The area is drained by major tributaries of the Godavari river i. e. Wardha, Waineganga and Painganga rivers (Table I). About 6000 small, medium and large scale industries are located in Chandrapur district. District has large deposits of coal and lime stone. Out of these, various industries are releasing waste water into the rivers directly or indirectly.

**Table I- Details of major rivers in Chandrapur district.**

River	From	To	Length
Wardha	Gaoshet ( lat 20.389727° lon 78.817204°)	Wadha (lat 19.896066° lon 79.149035°)	92.3 Km
Painganga	Parsoda (lat 19.761553° lon 78.838117°)	wadha (lat 19.896066° lon 79.149035°)	48.7 km
Painganga (united)	Wadha (lat 19.896066° lon 79.149035°)	Chapralla (lat 19.578419° lon 79.805658°)	114 km
Waineganga	Sawarla ( lat 20.732646° lon 79.741191°)	Chapralla (lat 19.578419° lon 79.805658°)	189 km
Total			444km

*Scenedesmus* is most common and diversified genus in Indian water bodies. This genus is currently divided in to several new genera (Eberhard H. Hegawald (1997, 2003). Till today various papers have been published on *Scenedesmus* diversity (Kamat(1963), Behrepatil & Deore(2013) and Patil(2013)) of Maharashtra state, but no significant data is available from Chandrapur district. In present study total 21 sites were selected from the three major rivers (Wardha, Waineganga and Painganga) to screen algal diversity (fig. II). Site 1-3 on river Painganga, Site 4-11 on united Painganga, site 12-14 on river Wardha, Site 15-21 on river Waineganga. In this study we found total twenty seven taxa belonging to twenty species of *Scenedesmus*, *Acutodesmus* and *Desmodesmus* genera.

**Material and Methods:**

Samples were collected from all 21 sites (Table II) during May, August, November and February months of 2013 – 14 period. From every site approximately 50 liters of running water is filtered through phytoplankton net of 20µ mesh size made up of bolting silk. The filtrate was preserved in 4% formaldehyde solution. Microphotography was done with the help of Coslab trinocular microscope with inbuilt CCD camera.

**Table II. Site Map**

S I	Pardi	19.74116, 78.91294
S II	Bori	19.806521, 78.999683
S III	Gadegaon Wirur	19.86346, 79.12374
S IV	Dhanora	19.90364, 79.18398
S V	Kadoli	19.87521, 79.28792
S VI	Sasti	19.83374, 79.33524
S VII	Rajura	19.81348, 79.37489
S VIII	Koipara	19.76654, 79.49025
S IX	Arvi	19.633623, 79.489308
S X	Polsa	19.508021, 79.588534
S XI	Tatepalli	19.581930, 79.703676
S XII	Gugus	19.955476, 79.099068

S XIII	Patala	20.127590, 78.996672
S XIV	Soit	20.279169, 78.818192
S XV	Gondpipri - Ashti	19.677346, 79.785461
S XVI	Gangapur	19.841112, 79.753918
S XVII	Saoli – Chamorshi	20.008005, 79.786234
S XVIII	Saoli – Gadhiroli	20.134877, 79.923606
S XIX	Kudesawali	20.323513, 79.949483
S XX	Brahmapuri - Armori	20.483042, 79.946445
S XXI	Brahmapuri - Wadsa	20.619367, 79.940179

Species were identified after, Smith (1916), Philipose (1967) & John D. M. et. al. (2005) and then confirmed from electronic databases Algaebase and Protist information server.

### Observation and Results

From present study we identified following taxa...

1. *Acutodesmus bernardii* (G.M.Smith) E.Hegewald, C.Bock & Krienitz: (Pl. I, Fig. 2,3)  
= *Scenedesmus bernardii* G. M. Smith  
[Philipose 1967, p. 251, fig. 162 a-b; Smith G. M. 1916, p. 436, fig. XXV: 6]  
Colony 4, 8 celled, cells fusiform to lunate.  
Dimension: 3  $\mu$  -6.5  $\mu$  broad, 26  $\mu$  -30  $\mu$  long.  
Occurrence: S4, S7, S9

Earlier record: Nashik (Beherepatil & Deore, 2013);

2. *Acutodesmus acuminatus* (Lagerheim) Tsarenko (Pl. II, Fig. 24)  
= *Scenedesmus acuminatus* (Lagerheim) Chodat  
[Philipose 1967, p. 251, fig. 161 a-b; Smith G. M. 1916, p. 437, fig. XXV: 3-5]  
Colony 8 celled, twisted. Inner cells fusiform and outer cell lunate.  
Dimension: 2.5  $\mu$  broad, 12  $\mu$  long.  
Occurrence: S6

Earlier record: Thrissur, Kerala (Arulmurugan et. al., 2010); Mahanadi, Madhya Pradesh (Unni & Pawar, 2010); Karachi, Pakistan (Aliya et. al., 2009); Sao Paulo, Brasil (Silva, 1999);

3. *Acutodesmus acutiformis* (Schröder) Tsarenko & D.M.John (Pl. II, Fig. 20)  
= *Scenedesmus acutiformis* Schroder  
[Philipose 1967, p. 260, fig. 169 a-b; Smith G. M. 1916, p. 456, fig. XXVI: 28-29]  
Colony 4 celled, Cells cylindrical fusiform and ridged.  
Dimension: 5  $\mu$  -7.5  $\mu$  broad, 15  $\mu$  -20  $\mu$  long  
Occurrence: S16, S18, S19, S20

Earlier record: Nashik (Beherepatil & Deore, 2013); Karachi, Pakistan (Aliya et. al., 2009);

4. *Acutodesmus dimorphus* (Turpin) Tsarenko (Pl. I, Fig. 6 Pl. III, Fig. 26)  
= *Scenedesmus dimorphus* (Turpin) Kuetzing  
[Philipose 1967, p. 249, fig. 160 a-c; Smith G. M. 1916, p. 434, fig. XXV: 8]  
Colony 4, 8 celled, outer cells acicular inner cells erect.  
Dimension: 2  $\mu$  -6  $\mu$  broad 20  $\mu$  -32  $\mu$  long.  
Occurrence: S1, S2, S3, S4, S7, S11, S13

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Nashik (Beherepatil & Deore, 2013); Ahmedabad, Gujarat (Kamat, 1962); Mahanadi, Madhya Pradesh (Unni & Pawar, 2010); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);

5. ***Acutodesmus incrassatulus*** (Bohlin) Tsarenko (Pl. I, Fig. 8)  
= *Scenedesmus incrassatulus* Bohlin  
[Philipose 1967, p. 252, fig. 163; Smith G. M. 1916, p. 440, fig. XXV: 9-10]  
Colony 4 celled, cells spindle shaped, polar nodules present.  
Dimension: 5  $\mu$  -10  $\mu$  broad 22  $\mu$  -24  $\mu$  long.  
Occurrence: S2, S7, S9  
Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Nashik (Beherepatil & Deore, 2013); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);
6. ***Acutodesmus obliquus*** (Turpin) Hegewald & Hanagata (Pl. I, Fig. 9)  
= *Scenedesmus obliquus* (Turpin) Kuetzing  
[Philipose 1967, p. 249, fig. 159 a-c; Smith G. M. 1916, p. 428, fig. XXV: 7]  
Colony 4 celled, cells fusiform and erect or outer slightly concave.  
Dimension: 2  $\mu$  -4  $\mu$  broad 18  $\mu$  -22  $\mu$  long.  
Occurrence: S1, S2  
Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Assam (Jena & Adhikary, 2007); Sikkim (Das & Keshri, 2012); Nashik (Beherepatil & Deore, 2013); Mahanadi, Madhya Pradesh (Unni & Pawar, 2010); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);
7. ***Desmodesmus abundans*** (Kirchner) E.Hegewald (Pl. III, Fig. 29)  
= *Scenedesmus abundance* (O. Kirchner) Chodat  
[Philipose 1967, p. 278, fig. 14 a-d; Smith G. M. 1916, p. 465, fig. XXX: 133-136]  
Colony 4 celled, cells oblong ovoid, outer cells with two terminal and two median spines, middle cells have single small spine on either side.  
Dimension: 3  $\mu$  broad 8  $\mu$  long Spines: 5  $\mu$  long.  
Occurrence: S1  
Earlier record: Nashik (Beherepatil & Deore, 2013); Karachi, Pakistan (Aliya et. al., 2009);
8. ***Desmodesmus brasiliensis*** (Bohlin) E.Hegewald (Pl. III, Fig. 32, 33)  
= *Scenedesmus brasiliensis* Bohlin  
[Philipose 1967, p. 261, fig. 170 a-b; Smith G. M. 1916, p. 458, fig. XXVI: 30-31]  
Colony 4 celled, cells oblong ellipsoid with ridges, 2-3 teeth from pole of all cells.  
Dimension: 5  $\mu$  broad 15  $\mu$  long.  
Occurrence: S13, S18, S19, S20, S21  
Earlier record: Assam (Jena & Adhikary, 2007); Sikkim (Das & Keshri, 2012); Nashik (Beherepatil & Deore, 2013); Ahmedabad, Gujarat (Kamat, 1962);
9. ***Desmodesmus maximus*** (West & G.S.West) E.H.Hegewald (Pl. I, Fig. 14)  
= *Scenedesmus quadricauda* var. *Maximum* West & G. S. West  
[Philipose 1967, p. 286, fig. 187 g; Smith G. M. 1916, p. 481, fig. XXVII: 40]  
Colony 4 celled, differs from type having larger cell dimensions.  
Dimension: 11.5  $\mu$  broad 32.5  $\mu$  long Spines: 25  $\mu$  long.  
Occurrence: S7  
Earlier record: Thrissur, Kerala (Arulmurugan et. al., 2010);
- 9a. ***Desmodesmus maximus*** (West & G.S.West) E.H.Hegewald (Pl. II, Fig. 19)  
= *Scenedesmus quadricauda* var. *westii* G. M. West  
[Philipose 1967, p. 286, fig. 160 h-i; Smith G. M. 1916, p. 480, fig. XXXII: 177-180]  
Colony 8 celled, arranged in single linear series, cells ovoid cylindrical.  
Dimension: 6  $\mu$  broad 16  $\mu$  long Spines: 15  $\mu$  long.  
Occurrence: S7  
Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Nashik (Beherepatil & Deore, 2013); Jalgaon, Maharashtra (Patil, 2013);  
Presently both *Scenedesmus quadricauda* var. *Maximum* West & G. S. West and *Scenedesmus quadricauda* var. *westii* G. M. West are merged under ***Desmodesmus maximus*** (West & G.S.West) E.H.Hegewald. But both varieties are significantly different from each other. Hence represented separately.
10. ***Desmodesmus opoliensis*** (P.G.Richter) E.Hegewald (Pl. I, Fig. 10, 11)

= *Scenedesmus opoliensis* P. G. Richter

[Philipose 1967, p. 275, fig. 181 a-b; Smith G. M. 1916, p. 481, fig. XXVII: 49]

Colony 4 celled, cells subfusiform, middle cells boat shaped, outer cells have spines.

Dimension: 5  $\mu$  broad 17.5  $\mu$  long.

Occurrence: S6, S7, S14

Earlier record: Nashik (Beherepatil & Deore, 2013); Thrissur, Kerala (Arulmurugan et. al., 2010);

11. ***Desmodesmus opoliensis* var. *carinatus*** (Lemmermann) E.Hegewald (Pl. II, Fig. 22)

= *Scenedesmus carinatus* (Lemmermann) Chodat

[Philipose 1967, p. 266, fig. 172 a-c; Smith G. M. 1916, p. 462, fig. XXVI: 25]

Colony 4 celled, cells naviculoid with longitudinal ridges, and long spines from the poles of outer cells.

Dimension: 3.5  $\mu$  -5  $\mu$  broad 15  $\mu$  long spines: 14  $\mu$  long.

Occurrence: S13, S14

Earlier record: Allahabad, Uttar Pradesh (Pandey et. al., 1981)

12. ***Desmodesmus opoliensis* var. *mononensis*** (Chodat) E.Hegewald (Pl. I, Fig. 11)

= *Scenedesmus opoliensis* var. *mononensis* Chodat

[Philipose 1967, p. 276, fig. 181 c-d]

Colony 4 celled, Cells broadly fusiform with rounded ends, outer cells have spines. Differ from type in having broader cells.

Dimension: 8.5  $\mu$  broad 22.5  $\mu$  long.

Occurrence: S7

Earlier record: Nashik (Beherepatil & Deore, 2013); Rajasthan (Srivastava, 2011);

13. ***Desmodesmus perforatus*** (Lemmermann) E.Hegewald (Pl. I, Fig. 12)

= *Scenedesmus perforates* Lemmermann

[Philipose 1967, p. 280, fig. 186 a-b; Smith G. M. 1916, p. 483, fig. XXVII: 47]

Colony 4 celled, cells oblong elliptical with intercellular spaces.

Dimension: 5  $\mu$  broad 15  $\mu$  long.

Occurrence: S7, S9

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Jalgaon, Maharashtra (Patil, 2013); Karachi, Pakistan (Aliya et. al., 2009);

14. ***Scenedesmus arcuatus*** (Lemmermann) Lemmermann (Pl. I, Fig.1)

[Philipose 1967, p. 256, fig. 160 a-c; Smith G. M. 1916, p. 449, fig. XXVI: 19-20]

Colony 8 celled, Cells ovoid and slightly bent.

Dimension: 4  $\mu$  -6  $\mu$  broad 9  $\mu$  -11  $\mu$  long.

Occurrence: S1

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Sikkim (Das & Keshri, 2012); Nashik (Beherepatil & Deore, 2013); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);

15. ***Scenedesmus armatus*** (R. Chodat) R. Chodat (Pl. III, Fig. 30)

[Philipose 1967, p. 261, fig. 171 a-c; Smith G. M. 1916, p. 460, fig. XXVIII: 53]

Colony 4 celled, cells oblong ellipsoid with longitudinal ridges. Outer cells have long spines from poles.

Dimension: 4.5  $\mu$  -5.5  $\mu$  broad 13  $\mu$  -15  $\mu$  long Spine: 20  $\mu$  -22  $\mu$  long.

Occurrence: S14

Earlier record: Thrissur, Kerala (Arulmurugan et. al., 2010); Rajasthan (Srivastava, 2011);

16. ***Scenedesmus armatus* var. *bogleriensis forma bicaudatus*** Hortobagyi (Pl. III, Fig. 31)

[Philipose 1967, p. 264, fig. 171 g-j]

Colony 4 celled, differs from type in having only two spines, arranged from opposite end poles of the colony.

Dimension: 4  $\mu$  broad 14.5  $\mu$  long Spines: 15  $\mu$  long.

Occurrence: S7

17. ***Scenedesmus armatus* var. *major*** G. M. Smith (Pl. II, Fig. 21)

[Philipose 1967, p. 266, fig. 171 k]

Colony 4 celled, differs from type in having round ends and larger cell dimensions. The individual is slightly smaller than the taxa but sufficient larger than type. Hence considered as var. major.

Dimension: 8.5  $\mu$  broad 21  $\mu$  long spines: 15  $\mu$  -19  $\mu$  long.

Occurrence: S1

Earlier record: Raipur, Chhattisgarh (Chakravarty & Naik, 2014)

18. *Scenedesmus bicaudatus* Dedusenko (Pl. II, Fig. 15)  
= *Scenedesmus quadricauda* var. *bicaudatus* Hansgirg

[Philipose 1967, p. 284, fig. 187 k-l]

Colony 4 celled, differs from type having only two spines from two opposite poles of colony.

Dimension: 5  $\mu$  broad 15  $\mu$  long spines: 13  $\mu$  long.

Occurrence: S2, S6, S7, S11

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); West Bengal (Jena & Adhikary, 2007); Nashik (Beherepatil & Deore, 2013);

19. *Scenedesmus bijuga* (Turpin) Lagerheim (Pl. I, Fig. 4, Pl. III Fig. 25)

[Philipose 1967, p. 252, fig. 164 c,e,f as *S. bijugatus* (Turpin) Kuetzing; Smith G. M. 1916, p. 441, fig. XXV: 2]

Colony 4, 8 celled, cells ovoid oblong with round tips, cell wall smooth.

Dimension: 5  $\mu$  -7.5  $\mu$  broad 15  $\mu$  -22  $\mu$  long.

Occurrence: S1, S2, S11, S16, S17, S18

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Nashik (Beherepatil & Deore, 2013); Jalgaon, Maharashtra (Patil, 2013); Ahmedabad, Gujarat (Kamat, 1962); Mahanadi, Madhya Pradesh (Unni & Pawar, 2010); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);

20. *Scenedesmus bijuga* var. *irregularis* (Wille) G.M.Smith (Pl. I, Fig. 5)

[Philipose 1967, p. 253, fig. 164 i, m as *S. bijugatus* (Turpin) Kuetzing forma. *irregularis*; Smith G. M. 1916, p. 448, fig. XXVIII: 59-62]

Colony 8 celled, cells spindle shaped. Differ from type in irregular and alternate arrangement of cells.

Dimension: 5.5  $\mu$  -7  $\mu$  broad 16  $\mu$  -17.5  $\mu$  long.

Occurrence: S6

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Jalgaon, Maharashtra (Patil 2013); Nashik (Beherepatil & Deore, 2013);

21. *Scenedesmus ellipticus* Corda (Pl. I, Fig. 7)

[John D. M. et. al. 2005, p. 393, fig. 97 b]

Colony 8, 16 celled, cells elliptical, cell wall smooth

Dimension: 7.5  $\mu$  broad 21  $\mu$  long.

Occurrence: S2

Earlier record: Sao Paulo, Brasil (Silva, 1999);

22. *Scenedesmus longispina* R.Chodat (Pl. I, Fig. 13)  
= *Scenedesmus quadricauda* var. *longispina* (Chodat) G. M. Smith

[Philipose 1967, p. 285, fig. 187 b-c; Smith G. M. 1916, p. 480, fig. XXVII: 42]

Colony 4 celled, cells ovoid to cylindrical with rounded tips, terminal cells have long recurved spines, Differs from type having longer spines.

Dimension: 5  $\mu$  broad 12.5  $\mu$  long spines: 13.5  $\mu$  long.

Occurrence: S7

Earlier record: Nashik (Beherepatil & Deore, 2013); Jalgaon, Maharashtra (Patil, 2013); Ahmedabad, Gujarat (Kamat, 1962); Sao Paulo, Brasil (Silva, 1999);

23. *Scenedesmus parvus* (G.M.Smith) Bourrelly (Pl. II, Fig. 18)  
= *Scenedesmus quadricauda* var. *parvus* G. M. Smith

[Philipose 1967, p. 286, fig. 187 f; Smith G. M. 1916, p. 480, fig. XXXI: 162-166]

Colony 2, 4 celled, cells ovoid cylindrical. Differs from type having smaller size.

Dimension: 3  $\mu$  broad 7.5  $\mu$  long spines: 4  $\mu$  long.

Occurrence: S1, S11

Earlier record: Nashik (Beherepatil & Deore, 2013); Ahmedabad, Gujarat (Kamat, 1962);

24. *Scenedesmus quadricauda* (Turpin) Brebisson (Pl. III, Fig. 27, 28)

[Philipose 1967, p. 283, fig. 187 a; Smith G. M. 1916, p. 473, fig. XXV: 39]

Colony 2, 4 celled, cells oblong cylindrical. Poles of terminal cells have long spines.

Dimension: 5  $\mu$  -6  $\mu$  broad 19  $\mu$  long Spine: 8  $\mu$  -15  $\mu$  long.

Occurrence: S1, S2, S3, S4, S6, S7, S10, S12, S13, S14, S16, S20

Earlier record: Ahmedabad, Gujarat (Kamat, 1962); Mahanadi, Madhya Pradesh (Unni & Pawar, 2010); Rajasthan (Srivastava, 2011); Karachi, Pakistan (Aliya et. al., 2009);

25. *Scenedesmus quadricauda* var. *eualternans* Proshkina-Lavrenko (Pl. II, Fig. 16)

[Philipose 1967, p. 285, fig. 187 e]

Colony 4 celled, differs from type having smaller size and arrangement of cells.

Dimension: 2.5  $\mu$  broad 7.5  $\mu$  long spines 7.5  $\mu$  long.

Occurrence: S2, S10

Earlier record: Ranchi, Jharkhand (Das Guru et. al., 2013)

26. *Scenedesmus quadrispina* Chodat (Pl. II, Fig. 17)

= *Scenedesmus quadricauda* var. *quadrispina* (Chodat) G. M. Smith

[Philipose 1967, p. 285, fig. 187 d,j; Smith G. M. 1916, p. 479, fig. XXVII: 43]

Colony 4 celled, cells oblong, outer cells with small recurved spine. Differs from type having small spines.

Dimension: 5  $\mu$  broad 15  $\mu$  long spines: 4.5  $\mu$  long.

Occurrence: S19

Earlier record: Eastern Himalaya, West Bengal (Das & Keshri, 2015); Nashik (Beherepatil & Deore, 2013); Thrissur, Kerala (Arulmurugan et. al., 2010);

27. *Scenedesmus smithii* var. *monotrichus* (Pl. II, Fig. 23)

Colony 4 celled, arranged in single linear series. Cells naviculoid, contact along the length except tips. All the cells have one sharp spine on either side.

Dimension: 7.5  $\mu$  broad 20  $\mu$  long.

Occurrence: S7

Philipose's variety has two spines from only one pole of the cell, and they are obliquely placed. But, the present alga has one spine from each pole, and cells are straight. Here it is considered as new variety *Scenedesmus smithii* var. *amphitrichus*.

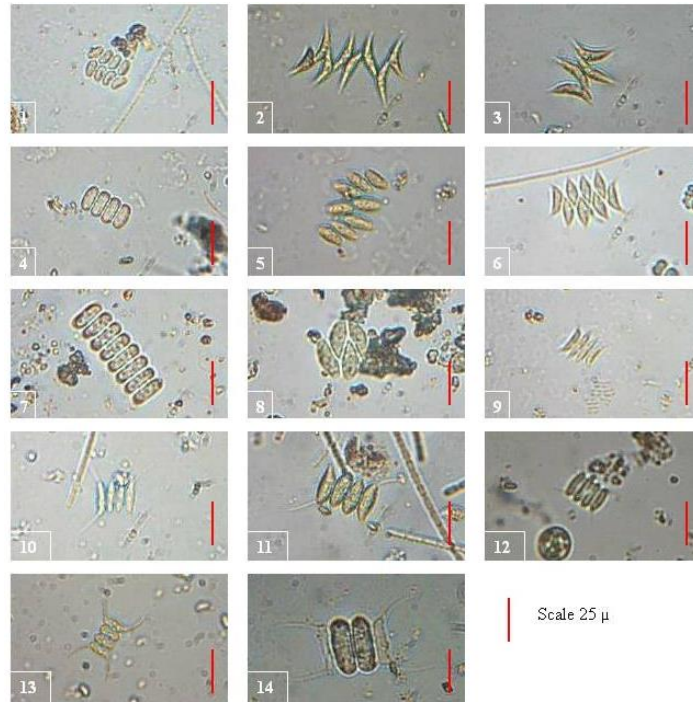


Plate – I 1-*Scenedesmus arcuatus* (Lemmarmann) Lemmarmann; 2,3- *Acutodesmus bernardii* (G.M.Smith) E.Hegewald; 4- *Scenedesmus bijuga* (Turpin) Lagerheim; 5- *Scenedesmus bijuga* var. *irregularis* (Wille) G.M.Smith; 6- *Acutodesmus dimorphus* (Turpin) Tsarenko; 7- *Scenedesmus ellipticus* Corda; 8- *Acutodesmus incrassatulus* (Bohlin) Tsarenko; 9-*Acutodesmus obliquus* (Turpin) Hegewald & Hanagata, 10 - *Desmodesmus opoliensis* (P.G.Richter) E.Hegewald; 11- *Desmodesmus opoliensis* var. *mononensis* (Chodat) E.Hegewald; 12- *Desmodesmus perforatus* (Lemmermann) E.Hegewald; 13- *Scenedesmus longispina* R.Chodat; 14- *Desmodesmus maximus* (West & G.S.West) E.H.Hegewald

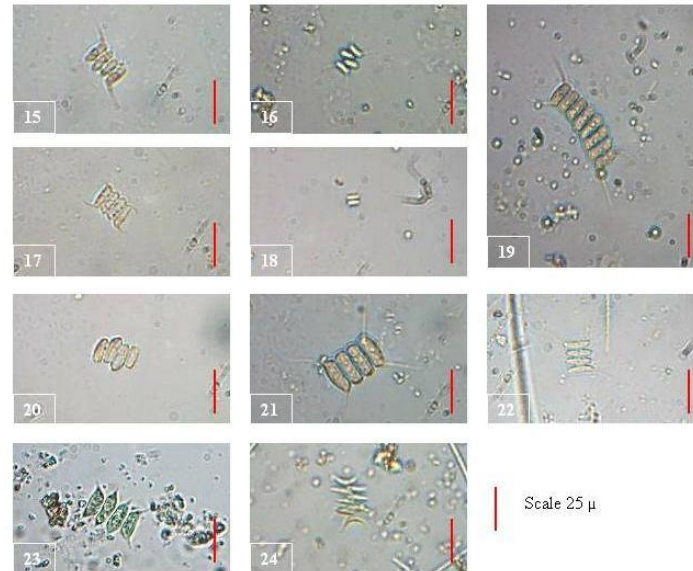


Plate –II 15- *Scenedesmus bicaudatus* Dedusenko; 16- *Scenedesmus quadricauda* var. *eualternans* Proshkina-Lavrenko; 17- *Scenedesmus quadrispina* Chodat; 18- *Scenedesmus parvus* (G.M.Smith) Bourrelly ; 19- *Desmodesmus maximus* (West & G.S.West) E.H.Hegewald(=*Scenedesmus quadricauda* var. *westii* G. M. West); 20- *Acutodesmus acutiformis* (Schröder) Tsarenko & D.M.John; 21- *Scenedesmus armatus* var. *major* G. M. Smith ; 22- *Desmodesmus opoliensis* var. *carinatus* (Lemmermann) E.Hegewald; 23- *Scenedesmus smithii* var. *monotrichus*; 24- *Acutodesmus acuminatus* (Lagerheim) Tsarenko.



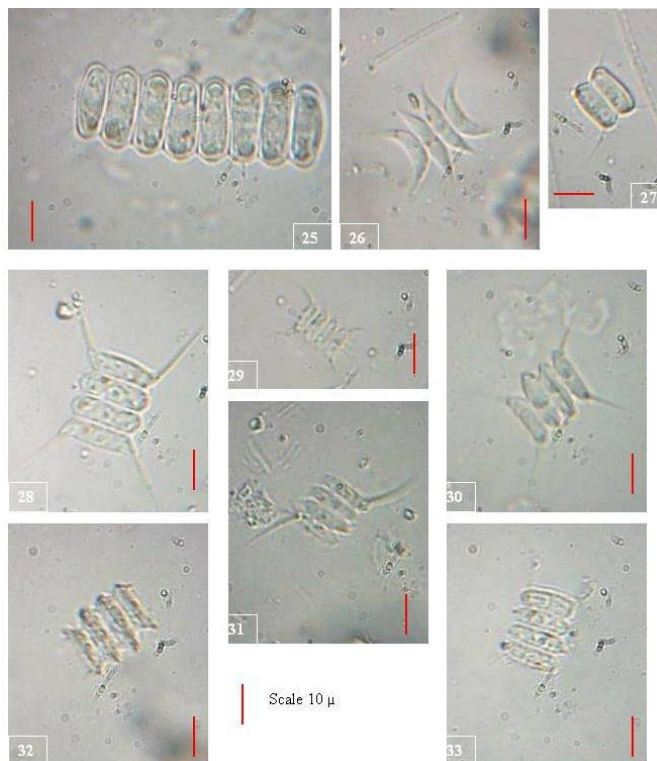


Plate –III 25- *Scenedesmus bijuga* (Turpin) Lagerheim ; 26- *Acutodesmus dimorphus* (Turpin) Tsarenko; 27,28- *Scenedesmus quadricauda* (Turpin) Brebisson; 29- *Desmodesmus abundans* (Kirchner) E.Hegewald; 30- *Scenedesmus armatus* (R. Chodat) R. Chodat; 31- *Scenedesmus armatus* var. *boglariensis* forma *bicaudatus* Hortobagyi; 32, 33- *Desmodesmus brasiliensis* (Bohlin) E.Hegewald .

#### Conclusion:

In Maharashtra the three genera are common and abundant. Beherepatil and Deore reported 32 species from different habitats of Nashik. Whereas Patil reported 23 taxa from Mangrul dam of Jalgon district. Sixteen taxa of *Scenedesmus* and related genera were reported by Mousumi Das & Jai Prakash Keshri from Cooch Behar district of Eastern Himalaya. In present study total 27 taxa belonging to 20 species of three genera have been successfully isolated, identified and described. Out of these one taxa *Scenedesmus smithii* var. *amphitrichus* is never explained by any worker, hence it is considered as new variety.

#### References:

- Aliya, R., A. Zarina and M. Shameel. 2009. Survey of fresh water Algae from Karachi, Pakistan. *Pak. J. Bot.*, 41(2): 861-870.
- Arulmurugan, P., S. Nagaraj & N. Anand. 2010. Biodiversity of fresh water algae from temple tanks of Kerala. *Rec. Res. Sci. Tech.* 2: 58-72.
- Beherepatil, K. H. and L. T. Deore, 2013. Genus *Scenedesmus* from different habitats of Nashik and its Environs (M.S.) India. *International Journal of Bioassays* 02(04): 727-734.
- Chakravarty, S., & Naik, M. 2014. Responses of chlorococcales algae to nickel. *Indian J. Sci. Res.*, 4(1), 75-81.
- Das Guru, S., G. S. Kumari and K. Verma, 2013. Bio-Survey of algal population (Chlorophyceae) with limnological variables in some tropical freshwater shallow lakes. *Phykos* 43(1): 68-76
- Das, D., & Keshri, J. P. 2012. Coccal green algae from Betang-cho lake (a high altitude lake in Eastern Himalaya). *Indian Hydrobiol.*, 15, 171-182.
- Eberhard H. Hegawald 1997. Taxonomy and Phylogeny of *Scenedesmus*. *Algae.* 12(4): 235-246.

Eberhard H. Hegewald, Christina Bock & Lothar Krienitz 2013. A phylogenetic study on Scenedesmaceae with the description of a new species of *Pectinodesmus* and the new genera *Verrucodesmus* and *Chodatodesmus* (Chlorophyta, Chlorophyceae). *Fottea*, Olomouc, 13(2): 149–164.

Guiry, M. D. & Guiry, G.M. 2015. *AlgaeBase*. World-wide electronic publication, National University of Ireland, Galway. <http://www.algaebase.org>.

John D. M. et. al., 2005. The freshwater algal flora of British Isles. Cambridge university press, London.

Kamat, N. D. 1962. Chlorophyceae of Ahmadabad, India. *Hydrobiol.* 20(3): 248-279

Kamat, N. D. 1963. The algae of Kolhapur, India. *Hydrobiologia* 22(3-4): 209-305.

Mousumi Das & Jai Prakash Keshri 2015. *Scenedesmus* Meyen & related genera in foot hills of Eastern Himalaya, India. *Phykos* 45 (1): 75-84.

Mrutyunjay Jena and Siba Prasad Adhikary 2007. Chlorococcales (Chlorophyceae) of Eastern and North-eastern States of India. *Algae*22(3): 167-183.

Pandey, U. C., G. L. Tiwari and D. C. Pandey, 1981. Additions to the Algal-flora of Allahabad VII. Chlorophyta, Chlorococcales. *Proc. Indian natn. Sci. Acad B*47 No. 2; 255-259

Patil, S. A. 2013. Genus *Scenedesmus* Meyen from Mangrul Dam Dist Jalgaon, Maharashtra. *Indian Journal of Fundamental and Applied Life Science* 3(2): 204-210.

Philipose M. T. 1967. Chlorococcales. I.C.A.R. New Delhi 1-365.

Protist Information Server, URL: <http://protist.i.hosei.ac.jp/>

Silva, L. H. S. 1999. Phytoplankton in an eutrophic reservoir (Lake Monte Alegre), Ribeirão Preto, São Paulo, Brazil. *Revista Brasileira de Biologia*, 59(2), 281-303.

Smith G. M. 1916. A monograph of the algal genus *Scenedesmus* based upon pure culture studies. *Trans. Wisc. Acad. Sci. Arts Lett.* 18: 422-539.

Srivastava, P. 2011. Phycodiversity of Rajasthan-III. Aquatic Algal Flora: A Compilation. *Vegetos-An International Journal of Plant Research*, 24(2), 186-201.

Unni K. S. and S. Pawar, 2000. The phytoplankton along a pollution gradient in the river Mahanadi (M. P. State) India- a multivariate approach. *Hydrobiol.* 430: 87 – 96.