The present paper deals with the systematic account of *Scenedesmus* Meyen from the Kol wetlands of Thrissur district, part of Vembanad Kol, a Ramsar site of Kerala. The surface water samples were collected monthly from ten stations during February 2005 to January 2006. Sixteen taxa of *Scenedesmus* have been collected and are described with their distribution in India. *S. acutiformis* Schroeder, *S. quadricauda* (Turpin) Brebisson var. *bicaudatus* Hansgirg and *S. quadricauda* (Turpin) Brebisson var. *longispina* (Chodat) G.M. smith are new reports to Kerala. Eight taxa namely, *S. acutiformis* Schroeder, *S. bernardii* G.M. Smith, *S. bijugatus* (Turpin) Kuetzing, *S. bijugatus* (Turpin) Kuetzing forma *parvus* (G.M. Smith) Philipose, *S. obliquus* (Turpin) Kuetzing, *S. opoliensis* P. Richter var. *mononensis* Chodat, *S. quadricauda* (Turpin) Brebisson var. *bicaudatus* Hansgirg and *S. quadricauda* (Turpin) Brebisson var. *longispina* (Chodat) G.M. smith are new reports to Thrissur district, Kerala.

**Key words:** Chlorococcales, Chlorophyceae, Kerala *Scenedesmus*, Thrissur kol

The present paper deals with the Genus *Scenedesmus* Meyen found in the Kol wetlands of Thrissur district, Kerala. The Thrissur Kol wetlands are distributed in Mukundapuram, Chavakkad and Thrissur taluks of Thrissur district, lies between 10° 20' to 10° 40' North latitudes and 75° 58' to 76° 11' East longitudes (Johnkutty and Venugopal 1993). The Kol wetlands are part of the Vembanad-Kol, a declared Ramsar site of Kerala.

Earlier, Philipose (1967) reported thirty one species of *Scenedesmus* from different parts of India. Jose and Patel (1992) reported ten taxa of *Scenedesmus* from south Kerala. Cherian (2006) reported fourteen taxa of *Scenedesmus* from Thrissakara, Kerala. Seventeen taxa of *Scenedesmus* were reported by Jose and Francis (2007) from Thodupuzha taluk, Kerala. Recently Arulmurugan et al. (2010) reported eight taxa of *Scenedesmus* from the temple tanks of Palakkad and Thrissur districts of Kerala.

Rawla and Rattan (1989) reported twenty two taxa of *Scenedesmus* from different parts of Punjab, Himachal Pradesh and Chandigarh. From Allahabad, Chadha and Pandey (1977) described seventeen forms of *Scenedesmus*.


**MATERIALS AND METHODS**

The present paper is based on the algal collections from the Kol wetlands of Thrissur district, Kerala. The surface water samples were collected monthly from ten stations namely Pullur (PR), Muriad (MD), Nambiankavu (NK), Mapranam (MM), Chemmanda (CM), Cherpu (CP), Palakkal (PL), Chettupuzha (CT), Anthikkad (AK) and

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Table: Seasonal and spatial variation of *Scenedesmus* in Thrissur Kol wetlands

<table>
<thead>
<tr>
<th>Sl. No:</th>
<th>Name of algae</th>
<th>SEASONS</th>
<th>STATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S i</td>
<td>S ii</td>
</tr>
<tr>
<td>1</td>
<td><em>S. acuminatus</em> (Lagerheim) Chodat</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td><em>S. acutiformis</em> Schroeder</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td><em>S. arcuatus</em> (Lemmermann) Lemmermann</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td><em>S. bernardii</em> G.M. Smith</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td><em>S. bijugatus</em> (Turpin) Kuetzing</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td><em>S. bijugatus</em> (Turpin) Kuetzing forma <em>parvus</em> (G.M. Smith) Philipose</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td><em>S. dimorphus</em> (Turpin) Kuetzing</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td><em>S. obliquus</em> (Turpin) Kuetzing</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td><em>S. opoliensis</em> P. Richter var. mononensis Chodat</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td><em>S. perforatus</em> Lemmermann</td>
<td>+</td>
<td>-</td>
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<tr>
<td>11</td>
<td><em>S. perforatus</em> Lemmermann var. major (Turner) Philipose</td>
<td>+</td>
<td>-</td>
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<tr>
<td>12</td>
<td><em>S. quadricauda</em> (Turpin) Brebisson</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>13</td>
<td><em>S. quadricauda</em> (Turpin) Brebisson var. <em>bicaudatus</em> Hansgirg</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td><em>S. quadricauda</em> (Turpin) Brebisson var. longispina (Chodat) G.M. smith</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>15</td>
<td><em>S. quadricauda</em> (Turpin) Brebisson var. quadrispina (Chodat) G.M. Smith</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>16</td>
<td><em>S. tropicus</em> Crow.</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

+ Present, - Absent, S i pre-monsoon season, S ii monsoon season, S iii post-monsoon season.


Enamavu (EM) during February 2005 to January 2006. The samples collected were preserved in 4% formalin solution. The identifications were based on the ICAR monograph by Philipose (1967) and the Camera Lucida drawings were prepared.

Plate 1 (Figures 1-17)
RESULTS
During the course of the present study on the algal flora of Thrissur Kol wetlands, sixteen taxa of *Scenedesmus* were collected and are described with their distribution in India.

**Systematic descriptions:**
- **Class:** Chlorophyceae
- **Order:** Chlorococcales
- **Family:** Scenedesmaceae
- **Subfamily:** Scenedesmoideae
- **Genus:** *SCENEDESMUS* Meyen

1. *Scenedesmus acuminatus* (Lagerheim) Chodat (Pl. 1, Fig. 1)
   - Colonies 4 celled, cells fusiform with sharp pointed ends, 4.9-7.8 μm broad, 23.3-31.1 μm long. (Locality/Month: MM/Mar).

2. *Scenedesmus acutiformis* Schroeder (Pl. 1, Fig. 2)
   - Colonies 4 celled, cells 4.9-6.8 μm broad, 13.6-16.5 μm long. (Locality/Months: MD/Jul; CT/Aug, Sep; EM/Dec).

3. *Scenedesmus arcuatus* (Lemmermann) Lemmermann (Pl. 1, Fig. 3)
   - Philipose, 1967. p. 256, fig. 166.
   - Colonies 8 celled, cells 6.8-7.8 μm broad, 9.8-10.7 μm long. (Locality/Months: PR/Mar, May, Sep; MD/May, Aug; NK/Feb; MM/Jan; CM/Feb; PL/Jul; PL/Jan, Aug; CT/Dec).

4. *Scenedesmus bernardii* G.M. Smith (Pl. 1, Fig. 4)
   - Philipose, 1967. p. 251, fig. 162.
   - Colonies 8 celled, cells 2-4.9 μm broad, 29.2-40.9 μm long. (Locality/Month: MM/Mar).

5. *Scenedesmus bijugatus* (Turpin) Kuetzing (Pl. 1, Fig. 5)
   - Philipose, 1967. p. 252, fig. 164 c,e,f.
   - Colonies 4 celled, cells 2.9-4.9 μm broad, 11.7-15.6 μm long. (Locality/Months: PR/Feb-May, Jul-Sep, Nov-Jan; MD/Feb, May, Aug, Oct, Jan; NK/Feb, Mar, Oct, Dec; MM/Mar; CM/Feb, Aug; CP/Dec; CT/Dec).

6. *Scenedesmus bijugatus* (Turpin) Kuetzing forma *parvus* (G.M. Smith) Philipose (Pl. 1, Fig. 6)
   - Philipose, 1967. p. 256, figs. 164 h,j.
   - 8 celled colony, cells 11.7 μm long, 3.9 μm broad. (Locality/Month: MM/Oct).
   - Distribution in India: West Bengal (Philipose 1967), Himachal Pradesh (Jha et al. 1985),

7. *Scenedesmus dimorphus* (Turpin) Kuetzing (Pl. 1, Fig. 7)
Philipose, 1967. p. 249, fig. 160ac.
Colonies 4 celled, cells 4.9-5.8 μm broad, 12.6-15.6 μm long. (Locality/Months: PR/May, Aug, Sep, Jan; PL/Febr, Mar; NK/Mar, Apr).

8. *Scenedesmus obliquus* (Turpin) Kuetzing (Pl. 1, Fig. 8)
Philipose, 1967. p. 248, fig. 159.
Colonies 4 celled, 15.6-23.3 μm broad, cells 4.9-6.8 μm broad, 15.6-16.5 μm long. (Locality/Months: PR/May, Oct; MD/Oct; MM/Jan, Feb).

9. *Scenedesmus opoliensis* P. Richter var. *mononensis* Chodat (Pl. 1, Fig. 9)
Philipose, 1967. p. 276, figs. 181 c, d.
Colonies 4 celled, cells 3.9-6.8 μm broad, 27.2-34 μm long. (Locality/Month: MM/Jan).

10. *Scenedesmus perforatus* Lemmermann (Pl. 1, Fig. 10)
Philipose, 1967. p. 280, figs. 186 a, b, g.
4 celled colonies, cells 5.8-7.8 μm broad, 13.6-16.5 μm long. (Locality/Months: PR/Nov; MD/May; MM/Mar; CM/Feb, May; CT/Dec).
Distribution in India: Kerala and Orissa (Philipose 1967).

11. *Scenedesmus perforatus* Lemmermann var. *major* (Turner) Philipose (Pl. 1, Fig. 11)
Philipose, 1967. p. 282, fig. 186 c-f, h-j.
Colonies 4 or 8 celled, cells 8.8-11.7 μm broad, 23.3-31.1 μm long. (Locality/Month: MD/May; MM/Feb; AK/Jun).

12. *Scenedesmus quadricauda* (Turpin) Brebisson (Pl. 1, Figs. 12, 13)
Colonies 4 celled, cells 4.8-7.8 μm broad, 16.5-19.5 μm long. (Locality/Months: PR/Feb-May, Jan; NK/Mar, May, Jan; CM/Feb, Nov, Jan; AK/Aug).
13. *Scenedesmus quadricauda* (Turpin) Brebisson var. *bicaudatus* Hansgirg (Pl. 1, Fig. 14)

Philipose, 1967. p. 284, fig. 187 k, l.
Colonies 4 celled, cells 3.9-4.9 μm broad, 12.6-20.4 μm long, terminal cells with a spine from one pole. (Locality/Month: PR/May).


14. *Scenedesmus quadricauda* (Turpin) Brebisson var. *longispina* (Chodat) G.M. smith (Pl. 1, Fig. 15)

Colonies 4 celled, cells 3.9-5.8 μm broad, 11.7-15.5 μm long. (Locality/Months: MD/Feb, Oct; NK/Mar, Apr; CM/Feb, Apr, May, Aug, Sep, Nov, Jan).


15. *Scenedesmus quadricauda* (Turpin) Brebisson var. *quadrispina* (Chodat) G.M. Smith (Pl. 1, Fig. 16)

Colonies 4 celled, cells 6.8-9.7 μm broad, 15.6-23.3 μm long. (Locality/Months: NK/Mar-May).


16. *Scenedesmus tropicus* Crow. (Pl. 1, Fig. 17)

Philipose, 1967. p. 279, fig. 185.
4 celled colonies, cells 6.8-7.8 μm broad, 21.4-24.3 μm long. (Locality/Month: NK/Apr; MD/May; EM/Apr, May).

Distribution in India: Kerala and Andhra Pradesh (Philipose 1967).

**Seasonal and spatial variation:**

In Mapranam (Station 4) nine taxa of *Scenedesmus* was found followed by Muriad (Station 2) with eight taxa. At Pullur (Station 1) and Nambiankavu (Station 3) seven taxa of *Scenedesmus* were distributed. The seasonal biodiversity analysis in the study area shows that thirteen taxa of *Scenedesmus* were found during pre-monsoon (Feb-May), nine during post-monsoon (Oct-Jan) and seven during monsoon (Jun-Sep) season (Table 1).

**DISCUSSION**

*S. acutiformis* Schroeder, *S. quadricauda* (Turpin) Brebisson var. *bicaudatus* Hansgirg and *S. quadricauda* (Turpin) Brebisson var. *longispina* (Chodat) G.M. smith are new reports to Kerala.

quadrispina (Chodat) G.M. Smith are reported by Arulmurugan et al. (2010) from Thrissur district, Kerala. Scenedesmus quadricauda (Turpin) Brebisson was reported from Cranganore (Suxena et al., 1973), Azhikode and Chalakudy (Philipose 1967), Thrissur district, Kerala.  

S. acutiformis Schroeder, S. bernardii G.M. Smith, S. bijugatus (Turpin) Kuetzing, S. bijugatus (Turpin) Kuetzing forma parvus (G.M. Smith) Philipose, S. obliquus (Turpin) Kuetzing, S. opoliensis P. Richter var. mononensis Chodat, S. quadricauda (Turpin) Brebisson var. bicaudatus Hansgirg and S. quadricauda (Turpin) Brebisson var. longispina (Chodat) G.M. Smith are additions to the algal flora of Thrissur district, Kerala.

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