

Research Article

OEDOGONIACEAE FROM JALGAON DISTRICT, MAHARASHTRA- OEDOGONIUM (LINK) HIRN AND BULBOCHAETE (AG.) HIRN

Dhande J.S., Jawale A.K. and *Patil S.A.

¹Department of Botany, Smt. P. K. Kotecha Mahila Mahavidyalaya, Bhusawal, Dist. Jalgaon, 425201

²Department of Botany, Dhanaji Nana Mahavidyalaya, Faizpur, Dist. Jalgaon, (M.S.)-425503

³Department of Botany, S.V.P. Arts and Sci. College Ainpur, Dist. Jalgaon, (M.S.)-425508

*Author for Correspondence

ABSTRACT

During extensive study on algal flora of Hartala lake (21° 00' 20.56" north latitude and 76° 01' 31.31" east longitude), district Jalgaon (M.S.) the authors collected 28 taxa of *Oedogonium* and 01 of *Bulbochaete*. Present communication includes 08 taxa of *Oedogonium* and 01 taxon of *Bulbochaete*. Of which *Oedogonium rufescens* (Wittr.) Hirn var. *lundellii* (Wittr.) Tiff. and *Bulbochaete varians* (Wittr.) Hirn. var. *variens* are addition to algal flora of Maharashtra. *Oedogonium pachydermum* var. *pachydermum* f. *pachydermum* (Wittr. & Lund) Hirn, *Oedogonium paucocostatum* Trans. var. *seriaceum* Presc. & Croas. are first time reported from India while *Oedogonium hartalensis* sp. nov., *Oedogonium intermedium* (Wittr.) Hirn var. *intermedium* f. *jalgaonii* f. nov., *Oedogonium plagiostomum* (Wittr.) Hirn var. *plagiostomum* f. *maharashtrensis* f. nov., *Oedogonium suecicum* (Wittr.) Hirn var. *gonzalesii* var. nov. are new to science.

INTRODUCTION

Generally most of oedogoniales are epiphytic on the aquatic angiospermic plants as *Ceratophyllum demersum* Linn., *Vallisneria spiralis* Linn., *Hydrilla verticillata* Rolye, on submerged grasses and on algae like *Pithophora* spp. Oedogoniales from Maharashtra known through the work of Kamat (1962, 1963, 1968, 1971), Gonzalves and Jain (1968, 1970), Ashtekar and Kamat (1978), Barhate and Tarar (1985), Kumawat and Jawale (2004), Jawale and Dhande (2005), Dhande and Jawale (2006, 2008). The present communication deals with study of 08 taxa of *Oedogonium* and one of *Bulbochaete*. Of these 02 taxa are addition to algal flora of Maharashtra, 01 taxon is addition to Indian algal flora while 04 taxa are new to science.

MATERIALS AND METHODS

The collections were made early in the morning between 7.00 to 10.00 am during 2004- 2006 from Hartala lake (M.S.). All the collected samples were studied fresh as far as possible and later preserved in 4 % formaline for further studies. Camera lucida drawings were made with the help of mirror type of camera lucida. The identification of taxa is based on the monograph Gonzalves (1981). The material is deposited in the Department of Botany, Dhanaji Nana Mahavidyalaya, Faizpur, district Jalgaon (M.S.).

Systematic Account

Order - Oedogoniales

Family - Oedogoniaceae

Genus- *Oedogonium* (Link) Hirn, 1900

Oedogonium hartalensis sp. nov. Plate 1, Figures 1, 2

Macrandrous heterothallic; vegetative cells slightly capitellate, those of female filaments 13.1– 17.7 µm in diameter, 38.4 – 64.1 µm long, basal cell inflated, 16.1 µm in diameter, terminal cell extended into a long seta up to 192.3 µm in length, while off male filaments 11.9– 12.3 µm in diameter, 13.2 – 25.4 µm long; oogonium single, globose, 41.5- 43.2 µm in diameter, 46.1-47.2 µm long, operculate, division median; oospore spherical not filling the oogonium, 33.8-34.0 µm in diameter, 36.1-36.8 µm long, median wall of oospore longitudinally costate, costae 13 in number; antheridia 3-6 seriate, 11.9– 13.1 µm in diameter, 6.1-7.7 µm long; spermatozoid two, division vertical (Coll.Nos. 214, 245).

Oedogonium hartalensis sp. nov. resembles *O. nigeriense* Gauth-Live. and *O. costatosporum* var. *costatosporum* Jao but differs from them in terminal cell extends into a long hyaline seta, vegetative cells

Research Article

slightly capitellate, vegetative cells of male filaments smaller, division of the oogonium median and oospores and antheridia smaller. It differs from *O. nigeriense* in having smaller cells of female filaments and smaller oogonia. From *O. costatosporum* var. *costatosporum* it differs in having shorter oogonia, costae fewer and minutely denticulate and vertical division of the antheridia. Therefore here it is considered as a new species.

Macrandrum, heterothallicum; cellulae vegetative paulum capitellatae, eae filamentorum femineorum 13.1 – 17.7 µm diam., 38.4 -64.1 µm longae, cellulae basalis inflata, 16.1 µm diam., cellulae terminalis setifera, satae usque ad 192.3µm longae, filamentorum vero masculinorum 11.9 -12.3 µm diam., 13.2 -25.4 µm longae, oogonium unicum, globosa, 41.5 - 43.2 µm diam., 46.1 - 47.2 µm longae, opeculatum, divisionae mediana; oospora globosa, oogonium haud implens, 33.8 - 34 µm diam., 36.1 - 36.8 µm longae, mesosporio longitudinaliter costato, costis 13; antheridia 3-6 seriata, 11.9 – 13.1 µm diam., 6.1 – 7.7 µm longae; spermatozoidae bina, divisionae verticali.

Holotype ; 214.

***Oedogonium intermedium*(Wittr.) Hirnvar.*intermedium*f. *jalgaoniif.* nov. Plate 1, Figure 3**

Macrandrous, homothallic, vegetative cells cylindric, 10.7 µm in diameter, 23.8 – 51.5 µm long, basal cell inflated; oogonium single, ovoid, 30.4-31.0 µm in diameter, 31.5-32.0 µm long; poriferous, pore supreme; oospore globose to ovoid, 27.7-28.5 µm in diameter, 25.4-26.3 µm long, oospore wall smooth; antheridia subepigynous, three, 10 µm in diameter, 5.4– 7.2 µm long; spermatozoid two, division horizontal. (Coll. Nos. 234,145).

This form resembles with *O. intermedium* (Wittr.) Hirn var. *intermedium* f. *tenius* Singh but differs from it in cells narrower, pore supreme, antheridia narrower and spermatozooids two instead of one, therefore here it is treated as a new forma.

Macrandrum, moneicum; cellulae vegetative cylindricae, 10.7 µm diam., 23.8 – 51.5 µm longae, cellulae basalis inflata, oogonium unicum, ovoideum, 30.4 - 31 µm diam., 31.5 -32 µm longae, poriferum, poro supremo; oospora globosa to ovoideum, 27.7- 28.1 µm diam., 25.4 -28.1 µm longae, sporarum parietes leves; antheridia subepigyna, 03, 10 µm diam., 5.4– 7.2 µm longae; spermatozoidae bina, divisionae horizontalli.

Holotype; 234.

***Oedogonium pachydermum*var.*pachydermum* f.*pachydermum* (Wittr. & Lund) Hirn Plate 1, Figure 4**

E.A. Gonzalves, p. 223, Figure 9.96A, 1981.

Macrandrous, homothallic; vegetative cells cylindric, 25 µm in diameter, 68.7-70.0 µm long; oogonium single, ellipsoid, 71.8 µm in diameter, 75.3 µm long, operculate, division superior; oospore ellipsoid, not filling the oogonium, 35.4 µm in diameter, 53.0 µm long, spore wall smooth; antheridia up to 3 seriate, subepigynous, 25.3-26.8 µm in diameter, 21.9-26.8 µm long; spermatozooids two, division horizontal (Coll. No. 226).

***Oedogonium paucocostatum*Trans. var.*seriaceum* Presc. & Croas. Plate 1, Figures 5, 6**

E.A. Gonzalves, p.359, Figure 9.245C, 1981.

Macrandrous, heterothallic; vegetative cells cylindric, 10.4-12.5 µm in diameter, 43-56.2 µm long; oogonium single, oblong or subcylindrical, 34.4 µm in diameter, 68.7 µm long, operculate, division superior; oospore spherical, filling the oogonium horizontally, 34.4 µm in diameter, spore wall three layered middle layer longitudinally costate, costae 12 in number, male filaments not observed (Coll. No. 288).

***Oedogonium plagiostomum*(Wittr.) Hirn var.*plagiostomum* f. *maharashtrensis*f. nov. Plate 1, Figures 7, 8**

Macrandrous, heterothallic, vegetative cells cylindric, those of female filaments 15.4 - 20 µm in diameter, 39.2-59.2 µm long, male filaments 15.4 µm in diameter, 20 - 23.1 µm long; oogonium single, globose, 43.8-44.5 µm in diameter, 53.8-54.3 µm long, poriferous, pore supreme; oospore globose, filling the oogonium, 40-40.6 µm in diameter, 41.5-42.2 µm long; spore wall smooth; antheridia upto 8-seriate generally alternating with vegetative cells, 11.6- 16.1 µm in diameter, 9.2 - 11.5 µm long; spermatozoid single (Coll. Nos. 214,245).

Research Article

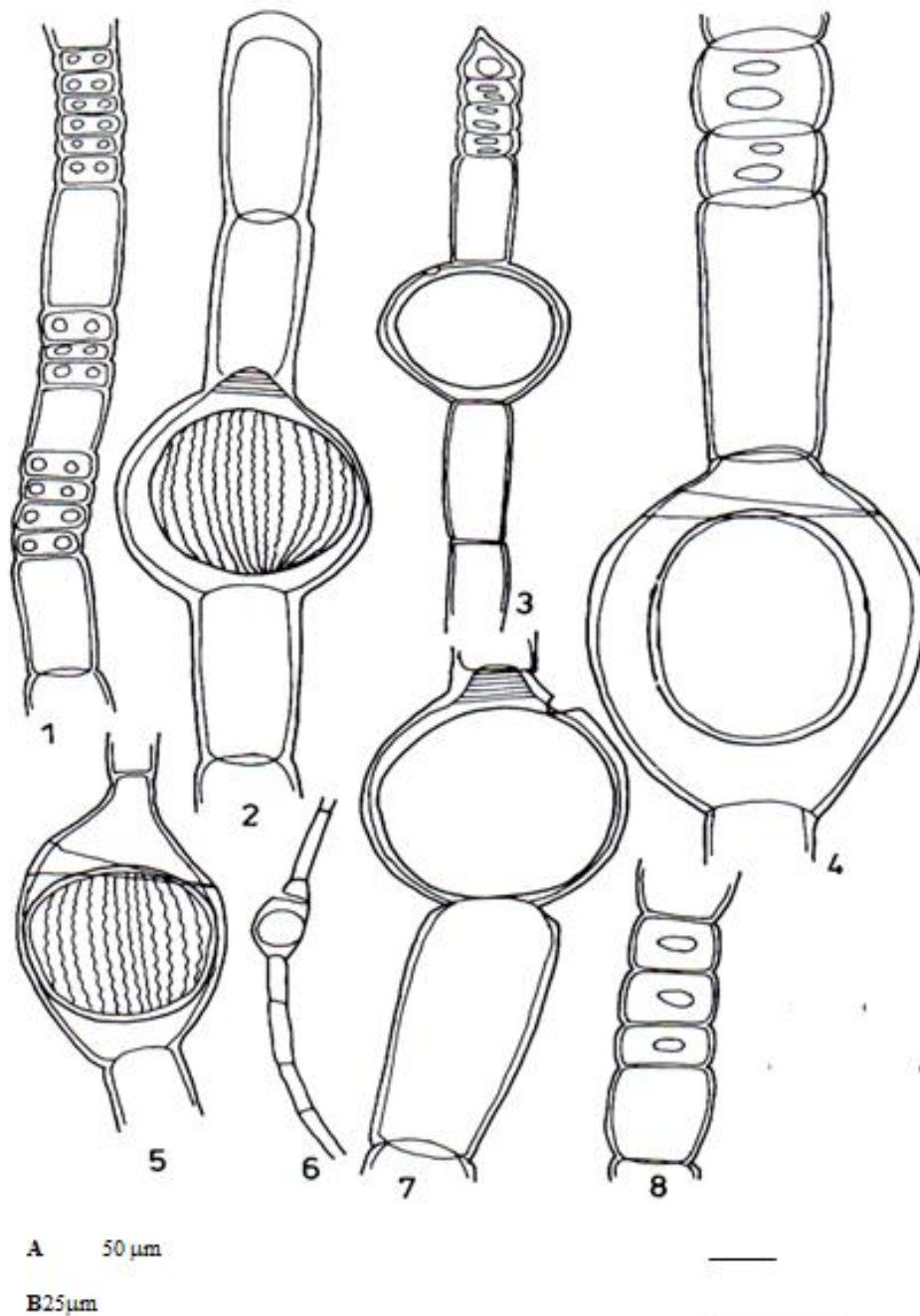


Plate 1:

- 1, 2. *Oedogonium hartalensis* sp. nov.
 3. *Oedogonium intermedium* (Wittr.) Hirn var. *intermedium* f. *jalgaonii* f. nov.
 4. *Oedogonium pachydermum* var. *pachydermum* f. *pachydermum* (Wittr. & Lund) Hirn
 - 5, 6. *Oedogonium paucocostatum* Trans. var. *seriaceum* Presc. & Croas.
 - 7, 8. *Oedogonium plagiostomum* (Wittr.) Hirn var. *plagiostomum* f. *maharashtrensis* f. nov.
- Scale bar A : 50 μm
 Scale bar B : 25 μm
 Scale A : Figure 6
 Scale B : Figure 1,2,3,4, 5, 7, 8

Research Article

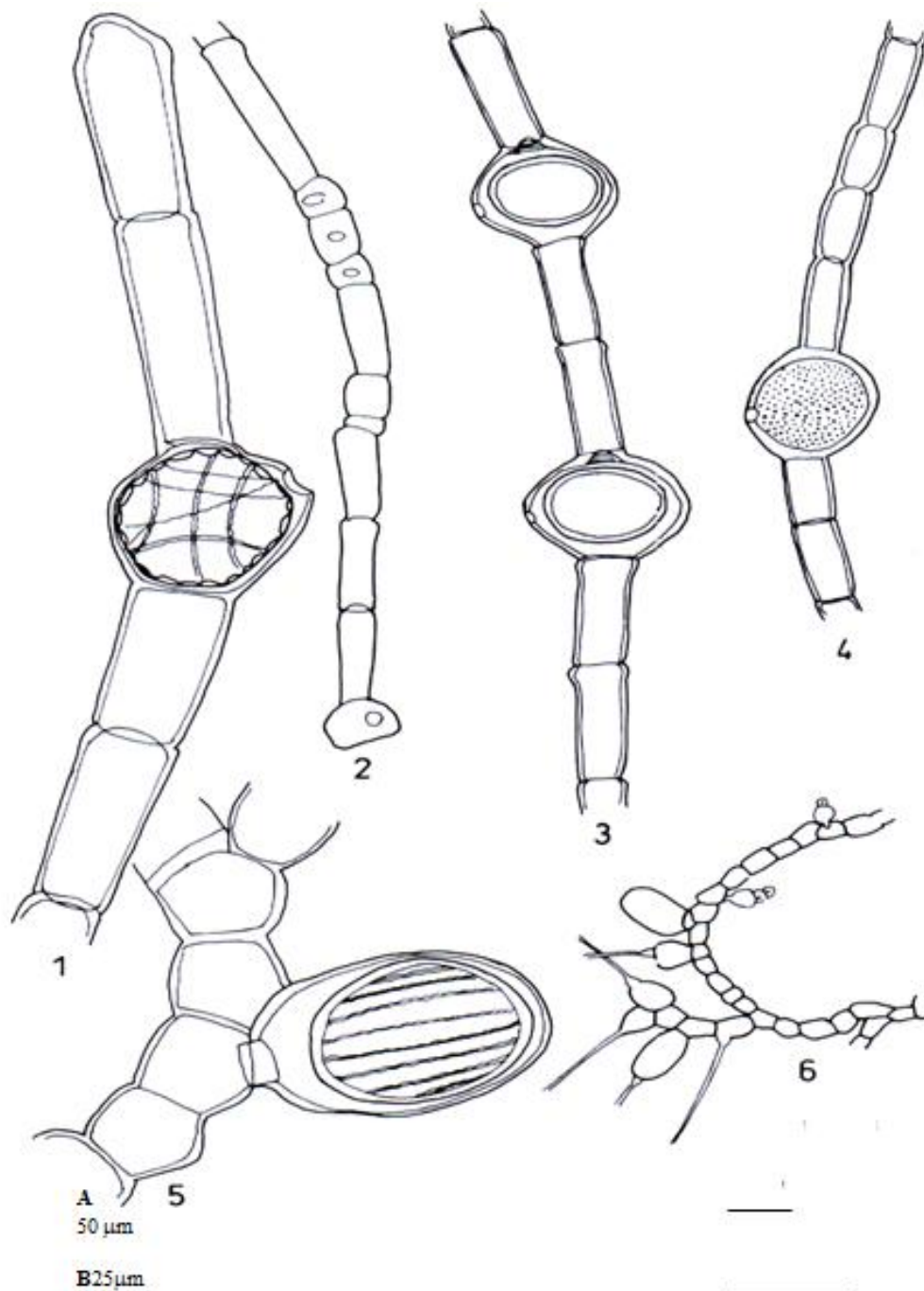


Plate 2:

1. *Oedogonium prescottii* Kam. f. *dispar* Gonz. & Jain
 - 2, 3. *Oedogonium rufescens* (Witr.) Hirn var. *lundellii* (Witr.) Tiff.
 4. *Oedogonium suecicum* (Witr.) Hirn var. *gonzalvesii* var. nov.
 - 5, 6. *Bulbochaete varians* (Witr.) Hirn var. *variens*
- Scale bar A : 50 μm
 Scale bar B : 25 μm
 Scale A : Figure 6
 Scale B : Figure 1,2,3,4, 5

Research Article

The present form agrees *O. plagiostomum* var. *plagiostomum* f. *minuta* but differs from it in having slightly larger oogonia, pore supreme and oospore filling oogonia, antheridia were not found in f. *minuta* whereas in this form antheridia are observed. Hence here it is considered as a new forma.

Macrandrum, heterothallicum; cellulae vegetative cylindricae, eae filamentorum femineorum 15.4 – 20 µm diam., 39.2 -59.2 µm longae, filamentorum vero masculinorum 15.4 µm diam., 20 – 23.1 µm longae, oogonium unicum, globosa, 43.8 -44.5 µm diam., 53.8 -54.3 µm longae, poriferum, poro supremo; oospora globosa, 40- 40.6 µm diam., 41.5-42.2 µm longae, sporarum parietes leves; antheridia usque 8- seriata, unico cellulis vegetativis alternantia, 11.6 – 16.1 µm diam., 9.2– 11.5 µm longae; spermatozoidae unicum.

Holotype; 214.

***Oedogonium prescottii* Kam. f. *dispar* Gonz. & Jain Plate 2, Figure 1**

E.A. Gonzalves, p. 300, Figure 180B, 1981.

Macrandrous, heterothallic; vegetative cells cylindric or slightly capitellate, 13.8-16.9 µm in diameter, 29.3– 53.1 µm long, basal cell hemispheric, 16.1 µm in diameter; oogonium single, globose or subglobose, 34.6 µm in diameter, 31.5 µm long, poriferous, pore superior; oospore filling the oogonium, 28.5 µm in diameter, outer spore wall spirally costate, costae irregularly dentate (Coll. No. 305).

***Oedogonium rufescens* (Wittr.) Hirn var. *lundellii* (Wittr.) Tiff. Plate 2, Figures 2, 3**

E.A. Gonzalves, p.293, Figures 9.169 E, F, 1981.

Macrandrous, heterothallic; vegetative cells slightly capitellate, those of female filaments slightly broader than those of male filaments, 8.5-8.8 µm in diameter, 21.5-25.4 µm long; while those of male filaments 6.1– 6.9 µm in diameter, 20 – 33.8 µm long; oogonia single, depressed-globose, 24.8-27.7 µm in diameter, 22.9-23.8 µm long, poriferous, pore median; oospore ellipsoid, not filling the oogonium, 19.2-20.8 µm in diameter, 15.3– 16.1 µm in long; spore wall smooth; antheridia 3-seriate, 7.7-8.4 µm in diameter, 6.1-10.8 µm long; spermatozoid single. (Coll. No.234).

***Oedogonium suecicum* (Wittr.) Hirn var. *gonzalvesii* var. nov. Plate 2, Figure 4**

Macrandrous, heterothallic; vegetative cells cylindric, 6.9– 7.7 µm in diameter, 14.4-15.6 µm long; oogonium single, globose or depressed globose, 20.7-21.9 µm in diameter, 23.0-24.8 µm long; poriferous, pore median or supramedian; oospore globose, nearly filling or not filling the oogonium, 17.7-18.2 µm in diameter, 20-21.8 µm long; punctate, punctae irregular. (Coll. Nos. 234,274).

This variety is distinguished from the var. *suecicum* and var. *minor* by much shorter cells, smaller oogonia and oospores, wall punctate instead of echinate.

Hence here it is considered as a new variety.

Macrandrum, heterothallicum; cellulae vegetative cylindricae, 6.9 – 7.7 µm diam., 14.4 - 15.6 µm longae, oogonium unicum, globosa vel depresso globosa, 20.7 -21.9 µm diam., 23 - 25 µm longae, poriferum, poro mediana vel supramediano; oospora globosa, vel oogonium haud implens, 17.7 – 18.2 µm diam., 20 – 21.8 µm longae, punctatae, punctae irregularis.

Holotype ; 234.

Genus *Bulbochaete* (Ag.) Hirn, 1817

***Bulbochaete varians* (Wittr.) Hirn. var. *variens* Plate 2, Figure 5,6**

E.A. Gonzalves, p.632, Figure 10.54 A, A', 1981.

Nanandrous, gynandrosporous; vegetative cells 18.5-21.5 µm in diameter, 18.5-25 µm long; oogonium ellipsoid, palent, situated below terminal seta or androsporangium, 28.1 – 34.4 µm in diameter, 50-56.3 µm long; oospore 30.7 µm in diameter, 53.1 µm long, outer spore wall longitudinally costate, costae serrate; androsporangia single, dwarf male near to oogonium, stipe 15.6-18.8 µm in diameter, 21.8-25 µm long; antheridia single or in twos, 9.4-11 µm in diameter 6.3-7.7 µm long. (Coll. No. 245).

ACKNOWLEDGEMENT

The authors are thankful to Principal and Head, Department of Botany, Dhanaji Nana Mahavidyalaya, Faizpur, Dist. Jalgaon, (M.S.) for providing laboratory facilities and Principal, Smt. P. K. Kotecha Mahila Mahavidyalaya, Bhusawal, Dist. Jalgaon, (M.S.) for constant encouragement.

Research Article

REFERENCES

- Ashtekar PV and Kamat ND (1978).** Oedogoniaceae and Zygnemataceae of Aurangabad, Maharashtra. *Phykos* 17(1&2) 35-38.
- Barhate VP and Tarar JL (1985).** Additions to Algal flora of Maharashtra: Chlorophyceae from Khandesh-I. *Phykos* 24(1&2) 180-183.
- Dhande JS and Jawale AK (2006).** On *Oedogonium* (Link) Hirn from Jalgaon district, Maharashtra. *Geobios* 33 321-322.
- Dhande JS and Jawale AK (2008).** *Oedogonium* (Chlorophyceae, Oedogoniales) from Jalgaon District. *Indian Hydrobiology* 11(1) 43-46.
- Gonzalves EA (1981).** *Oedogoniales*. I.C.A.R. New Delhi 1-757.
- Gonzalves EA and Jain SC (1968).** Some Oedogoniaceae from Tungar Hill and surrounding areas. *Phykos* 7(1&2) 9-22.
- Gonzalves EA and Jain SC (1970).** Some Oedogoniaceae from Thana District. *Phykos* 9(1&2) 1-16.
- Jawale AK and Dhande JS (2005).** Some species of *Oedogonium* from Hartala lake, district Jalgaon, Maharashtra. *Indian Association of Aquatic & Biologists* 20(2) 17-20.
- Kamat ND (1962).** Two new Oedogonia from India. *RevueAlgologique* 6(3) 217-219.
- Kamat ND (1963).** The algae of Kolhapur, India. *Hydrobiologia* 22(3-4) 209-305.
- Kamat ND (1968).** Algae of Alibag, Maharashtra. *Journal of the Bombay Natural History Society* 65(1) 88-104.
- Kamat ND (1971).** On *Oedocladium protonema* Stahl ex Hirn from Maharashtra. *Phykos* 10(1&2) 102-105.
- Kumawat DA and Jawale AK (2004).** On some *Oedogonium* sp. from fish ponds in Anjale, district Jalgaon, Maharashtra. *Indian Association of Aquatic & Biologists* 19(2) 14-16.