International Research Journal of Natural and Applied Sciences
ISSN: (2349-4077)
Impact Factor- 5.46, Volume 5, Issue 4, April 2018
Website- www.aarf.asia, **Email** : editor@aarf.asia , editoraarf@gmail.com

GENUS SCENEDESMUS MEYEN (1829) FROM THE MARATHWADA REGION OF MAHARASHTRA, INDIA

Yadav S.G.
Department of Botany Shivaji Mahavidyalaya Renapur Dist.Latur 413527 (MS) India

ABSTRACT

During extensive studies on algal taxonomy of Beed district in the Marathwada region of Maharashtra the author came across the several interesting members of Chlorococcales.The present paper deals with systemic enumeration of genus Scenedesmus Mayen (1829).

INTRODUCTION:

Algae are the large and diverse group of plant kingdom comprising simple, typically autotrophic organisms, ranging from unicellular to multicellular forms, they are important members of plant world and several of them are significant to man in many ways. They are beneficial in the field of agriculture, industry, medical science, space research, bio-diesel production and bioremediation. Fritsch (1935) classified green algae into eleven orders, of these even orders non-flagellated, unicellular and colonial forms have been reported in chlorococcales and they have their own identity. The genus Scenedesmus Meyen has 02-18 numbers of cells are arranged in even combinations. Now a days the researchers have paid their attention to genus Scenedesmus for its biochemical characteristics as it provides biomass yielding proteins, lipids and carbohydrates (Yuwalee,2014),also as potential energy source. Review of literature reveals that, studies on genus Scenedesmus in abroad and in India have been done extensively by many research workers (Nandan (1986) Barhate(1981) Karande andJagtap (1994) Tarar (1998)Leghari and Jhangir (2001) Jawale (2003) Patil (2013) Unapaproan and Ramehprabhu (2014)but in

Marathwada region of Maharashtra except few reports (Ashtekar (1979) Kamat (1974) Sirsat (2004) very rare attention has been paid although the climatic conditions of Marathwada region are most suitable to grow algae luxuriantly and in diverse form, therefore to fulfil this the present investigation has been carried out.

METHODS AND MATERIALS:

The exact geographical location of Beed district is at 16.65^{o}N 74.13^{o}E. It has a mean elevation of 530 meters (1738 feet). Beed district is located on the Deccan plateau. The different sites were selected for the collections of algae; those were pools, ponds puddles, cisterns, talaos, and dams, polluted water passages (gutters), streamlets, streams, rivers, dripping rocks, water falls, industrial waste water, moist soils and nursery ponds. The algal collections were made regularly and acid washed collection bottles were used for the collection of algal samples. Field note book was maintained in which the colour of the algae, habit, habitat, dates of collection and pH of the water was recorded. On return to the laboratory the collections were carefully observed under the microscope, all collections were preserved in 4% commercial formalin added with 5% glycerine. Generally 5 to 10 random temporary mounts were made from each collection for microscopic observations. Camera Lucida diagrams of these algae have been drawn by mirror type of camera Lucida. The taxonomic description and identification of algal taxa was performed by referring to the standard literature on algae. Philipose (1967) Smith (1951, 1955), Prescott (1961) and relevant research papers.

SYSTEMIC ENUMERATION*:SCENEDESMUS* Meyen, 1829

***Scenedesmus abundans* (Kirchner) Chodat**

Colonies consisting of usually 4 cells, arranged in a single series; cells ellipsoid-cylindric; terminal cells with 2 polar spines and 3 spines on lateral wall; inner cells with a spine at each pole; cells 2.5-3µ in diameter, 7.5-8µ long; spines 2.5-5µ long.

***Scenedesmus acuminatus* (Lag.) Chodat**

Colonies consisting of 4 cells, arranged in a linear series; cells strongly lunate, with sharply pointed apines, the convex walls adjoined inwardly; the concave walls faces directed outward; cells 2.8-4.8µ in diameter, 27.5-34.8µ long.

In a small stream (8.7), Manjarath (03-04-06), In a stream (8.6), Behind the Dharur Fort (01-05-06); In a pool (8.5), Nagar road, Beed (Febraury 07).

***Scenedesmus acutiformis* Schroeder**

Colonies consisting of 4 cells, arranged in a single series; cells fusiform-elliptic, with sharply pointed poles; inner cells with a single facial longitudinal ridge, outer cells with 2-4 longitudinal ridges; cells 4.8-5.5µ in diameter, 15-16.5µ long; 4-celled colonies 17.5-20µ in diameter.

In a small pond (8.7), at the side of Karpara river Beed (10-01-07); In a small stream (8.6), Pali (03-02-07).

***Scenedesmus arcuatus* (Lemmermann) Lemmermann**

Colonies consisting of 8 cells, curved, with small intercellular spaces; cells arranged in two series, oblong-ovoid; cell wall smooth, without teeth or spines; cells 3.2-4.8µ in diameter, 7.5-8.8µ long.

In a stream (8.7), Manjarsumbha (07-08-06); In a pool (8.6), Patoda (17-10-07); In a cistern (8.5) Neknur (07-08-08).

***Scenedesmus arcuatus* Lemmermann v. *capitatus* G.M. Smith**

Colonies consisting of 4 cells, arranged in two series; cells slightly curved with one side convex and the other straight or concave; ends of cells stumpy, with nodular thickening; cells 3-4.8µ in diameter, 12-14.8µ long.

In a rock pool (9), Manjarath (08-04-06).

***Scenedesmus armatus* (Chodat) G.M. Smith**

Colonies consisting of 4 cells; terminal cells with a single long spine from each pole; cells with a median, lateral longitudinal rib; cells oblong-ellipsoid, arranged in a linear series; cells 3-6.5µ in diameter, 7.5-12.5µ long, spines 6.8-10.2µ long; colonies up to 12.5-25µ in diameter.

In a small pool (8.7), near Jai Bhawani Sugar Industry (03-09-07).

***Scenedesmus armatus* (Chodat) G.M. Smith v. *bicaudatus* (Guglielmetti) Chodat**

Colonies consisting of 4 cells, arranged in a single series, terminal cells with large spines, only at one pole alternating with each other, internal cells with longitudinal ribs; cells 4-4.8µ in diameter, 10-14.5µ long, spines 5-7.5µ long; colonies up to 15-17.5µ in diameter.

In a stream (8.5), Raimoha (03-07-07); In a small pool (8.5), Hirapur, Padalshinghi (04-08-07).

***Scenedesmus armatus* (Chodat) G.M. Smith v. *major* G.M. Smith**

Colonies consisting of 4 cells, arranged in a partially alternating series; cells oblong-ellipsoid, with broadly rounded ends; terminal cells with a single, long, usually curved or unevently bent spine at each pole, inner cells with a median, incomplete longitudinal ridge; cells 7.5-8.5µ in diameter, 18.5-20.2µ long, spines 14-18µ long; colonies up to 20-33µ in diameter.

***Scenedesmusbernardii* G.M. Smith**

Colonies consisting 4, lunate cells, arranged in a single series, but with terminal cells at an angle to the plane of arrangement of the inner cells; cells adjoined alternately by the apex of one cell to the midregion of the next in series; wall without spines, or teeth; cells 2.8-4µ in diameter, 13-17.5µ long.

***Scenedesmus bijugatus* (Turpin) Kuetzing**

Colonies consisting of 4-8 cells, arranged in a single linear series; cells oblong, with broadly rounded ends, 4.8-5.2µ in diameter, 10-15µ long.

In a small pool (8.7), near Dharmapuri Talao (07-04-07); In a water passage. In a small pool, In Sindhaphana river (8.5), (22-08-07); In a pond (9), In a pool (9.5), Chinchwan (04-02-08); In a puddle (8.5), In a rock pool (8.7), In a stream (8.7), near Sarni Sanghavi (03-11-07); In a polluted water passage (gutter) (8.7), Barshi naka, Beed (March 08).

***Scenedesmus bijugatus* (Turpin) Kuetzing v. *alternans* (Reinsch) Hansgirg**

Colonies consisting of 4-8 cells, arranged in 2 alternating series; cells 3-4.8µ in diameter, 7.5-11.5µ long.

In a cisterns, (8.5), Adarsha Nagar Beed, (03-01-08); In a stream (8.5), Shepwadi Ambajogai (02-02-08); In a pool (8.7), Beed, (02-03-08).

***Scenedesmus bijugatus* (Turp.) Kuetz. v. *bicellularis* (Chodat) Philipose**

Colonies consisting of 2 cells, cylindrical; cells 4.5-5.2µ in diameter, 10-12µ long.

In a streamlet (8.5), Hiwara, Pahadi (02-10-06); In a small water passage, In a rock pool (9), Manjarsumbha (04-11-07); In Bindusara river (8.5), (06-11-07); In Sindhaphana river (8.5), (22-11-07); In a stream (8.5) behind the Law College, Beed. (09-12-08).

***Scenedesmus bijugatus* (Turp.) Kuetz. v. *graevenitzii* (Bernd.) Philipose**

Colonies consisting of 8 cells; cells fusiform to ellipsoid, arranged in an alternating series with adjacent cells in contact only along a short portion of their length; cells 4.8-6.8µ in diameter, 15-17.5µ long.

In Godavari river (8.5), Shahagadh (18-07-06); In a polluted water passage (8.5), Mondha road, Beed (02-08-06); In a polluted water passage (8.7), near Jai Bhawani Sugar Industry, Gadhi, Georai (04-08-06); In a small pool (8), Hiwara pahadi (02-10-06); In a streamlet (8.5), behind the Law College, Beed (03-12-06); In a river (8.5), Saradgaon (02-01-07); In a small pool (8.7), Georai (05-09-07); In a rock pool (8.5), Dharmapuri (07-11-07); In a pool (8.7), Manjarsumbha (11-11-08).

***Scenedesmus bijugatus* (Turpin) Kuetzing v. *irregularis* Wille**

.Colonies consisting of 8 cells; arranged in double and in an irregular sub alternating series; cells 2.8-4.8µ in diameter, 5-6.8µ long.

In a polluted water passage (gutter) (8.7), Hiralal chowk Beed, (08-01-06); In a polluted water passage (8.7), Bashirgang, Beed (04-03-06); In Bindusara river (8.5), (August 06); In a water passage (8.5), Mondha road Beed (02-08-06); In a pool (8.5), Chausala (04-11-07); In a small pool (8), Pathrud (08-12-07); In a streamlet (8.7), Sautada (02-04-08); In polluted water passage (9), near Karpara river, Nagar road, Beed (05-05-08).

***Scenedesmus brasiliensis* Bohlin**

Colonies consisting of 2-4-8, subcylindric to ellipsoid cells, arranged in a single series; apices of cells with 1-3 short teeth; cells with median longitudinal ridge extending between the apices of each cell; cells 4.8-5.2µ in diameter, 14-17.5µ long.

In a small streamlet (8.8), Hirapur (19-08-07); In a stream (8.5), Hiwara, Pahadi (07-10-07); In a pool (8.7), Manjarsumbha (11-11-08).

***Scenedesmus denticulatus* Lagerheim**

Colonies consisting of 4 cells, arranged in a single series; cells ovoid-oblong, apices of outer cells with 2 short teeth at each pole, the inner cells with 2 short teeth at one pole alternating to each other; cells 4-5.2µ in diameter, 10-15.2µ long; 4 celled colonies up to 20-23µ in diameter.

In a polluted water passage (gutter) (8.7), Neknur (07-12-07); In a rock pool (9), Manjarath (08-02-08); In a pool (8.6), Patoda (18-02-08).

***Scenedesmus dimorphus* (Turpin) Kuetzing**

Colonies consisting of 4-8 cells, arranged in a linear to sub-alternating series; outer cells of the colony more or less lunate, strongly curved with acute apices, the inner cells with straight, sharp apices; cells 3.8-4.5µ in diameter, 17.2-24.8µ long.

In a polluted water passage (8.7), In a Bindusara river (8.5), In a Bindusara dam, In a stream, (8.5), Pali, Beed (19-08-06); In a pool (9.5), Lukkha Masla (04-09-06); In a stream (8.5), Kapildhar (05-10-07).

***Scenedesmus dimorphus* (Turpin) Kuetzing f. *tortus* Smith**

Colonies consisting of 4-cells, arranged in a single series; the outer cells of the colony lunate, strongly curved, inner cells tapering at both the ends; cells 4.7-5.2µ in diameter, 25-27µ long.

In a small streamlet (8.5) Kapildhar (16-08-06); In Sindhaphana river (8.5), (22-11-07); In a streamlet (8.7), Sautada (02-04-08).

***Scenedesmus incrassatulus* Bohlin**

Colonies consisting of 4 cells; cells fusiform, arranged in sub alternating series, with one side convex and the other side more or less straight to slightly concave; ends of cells stumpy and with apical nodules; cells 4-4.8 µ in diameter, 14.8-17.5 µ long.

In a pool (8.7), Kada, (04-04-06); In a road side puddle (8.7), Aashti-Kada (06-04-06); In a polluted water passage, (02-04-08); In a Talao (8.5), Behind the Dharmapuri Fort; In a polluted water passage, (gutter), (9), near the thermal power station, Parli Vaijanath (December 08).

***Scenedesmus longus* Meyen**

Colonies consisting of 4-cells; poles of terminal cells with two spines; internal cells with one spine at one pole; cells cylindrical, 3-4.5µ in diameter, 9-12µ long; spines 8-12µ long.

In a pool (8.7), (November 08).

***Scenedesmus longus* Meyen var. *dispar* (Breb.) G.M. Smith.**

Colonies consisting of 4-cells, outer cells with oblique spine from each pole, inner cells with a single, short spine from one pole only; cells 2.8-4.5 µ in diameter, 10-12.5 µ long; spines up to 7.5 µ long.

In a streamlet (8.5), Wanjarwadi, (08-01-06); In a streamlet (8.5), Shahagadh (08-02-06); In a small pool (8.5), near Majalgaon dam (03-08-07); In a cistern (8.5), Beed (17-11-08); In a pond (8.5), Kapildhar (20-12-08).

***Scenedesmus obliquus* (Turpin) Kuetzing.**

Colonies consisting of 4 cells, arranged in a single series; cells fusiform, with slightly rounded ends and usually with straight sides; outer side of terminal cells concave to slightly convex; cell wall smooth; apices of cells apiculate; cells 4.8-5.2 µ in diameter, 12.5-15.2 µ long.

In a pollted water passage (9), near the Barshi Naka, Beed (02-02-07); In Godavari river (8.5), Shahgadh, (September 07); In a rock pool (9), Pathrud (26-12-07); In a streamlet (8.5), Sautada (02-04-08),

***Scenedesmus opoliensis* P. Richter**

Colonies consisting of 4 cells, arranged in a single series; cells naviculoid, free walls of outer cells slightly convex, the lateral adjoined walls in contact along 1/3 – 2/3 of their length; apices of outer cells with 2 long spines at each pole, inner cells with a short spine at one pole only; cells 4.8-5.4 µ in diameter, 12.2 – 14.8 µ long; colonies upto 18.8 µ in diameter.

In a small pool (8), Kada (04-04-06); In a pond (8.5) Kapildhar (20-12-08).

***Scenedesmus opoliensis* P. Richter var. *mononesis* Chodat**

Colonies consisting of 4 cells, arranged in a single series; terminal cells with attenuate, semitruncate to rostrate ends and with a long, straight or recurved spines from each pole, internal cells broadly fusiform, with rounded ends and without spines; cells 5-5.4 µ in diameter, 12.5 – 14. µ long; spines 10-14.2 µ long; colonies up to 20-22.5 µ in diameter.

In a small pool (8.5), Kasapuri-Majalgaon (06-12-06); In a stream (8.5), In Sarni Sanghavi Dam (10-09-07); In a streamlet (8.5), (November-08).

***Scenedesmus platydiscus* (Smith) Chodat.**

Colonies consisting of 8 cells arranged in a double series; cells oblong- elliptic, interstices between cells absent; cells 5-7.2 µ in diameter, 10-12.5 µ long.

In Sindhphana river (8.5) (10-10-06); In a small pool (8.5), behind the Yeshwantrao Chavan College, Ambajogai (08-11-07); In a puddle (8.5), Sautada (02-04-08).

***Scenedesmus quadricauda* (Turpin) de Brebisson**

. Colonies consisting of 4 cells, arranged in a linear series; cells oblong-cylindrical, with rounded ends; outer cells with a long, more or less straight spines; cell wall smooth, without ridges; cells 4.2-5.5 µ in diameter, 13.8-15 µ long, spines 12.5-15.2 µ long.

In polluted water passage (9), near Dr. Babasaheb Ambedkar Chowk, Beed (19-01-06); In a puddle (8.5), In a rock pool (9.5); In a cistern (8.5), Potoda (02-02-06); In a small pool (8.5), Kada (04-04-06); In a stream (8), behind the Dharmapuri Fort (08-10-06); In Godavari river (8.5), Shahagadh (October 06); In a streamlet (8.5), Hiwara pahadi (02-10-06); In a stream (8.5), Majalgaon (03-08-07); In a pool (8.5), Kaiz (15-10-07), In a Karpara river (8.5), Beed, (08-10-08); In a pond (8.5), Kapildhar; In a stream (8.5), Kapildhar, (December 08); In a stream (8.5), Sautada
(26-12-08).

***Scenedesmus quadricauda* (Turp.) de Breb. v. *eualternans* Proschk**

Colonies consisting of 4 cells, arranged in a sub alternate series; cells broadly ellipsoid, with broadly rounded ends; cells 2.5-3.8 µ in diameter, 7.5-9.8 µ long; outer cells with 2 spines at each pole, inner cells without spines; spines 5-6.8 µ long.

In a road side puddle (8.5), Aashti (12-02-06); In a small stream (8.5), Kada (04-04-06); In a small streamlet (8.5), Telgaon (21-12-08).

***Scenedesmus quadricauda* (Turp.) Breb. v. *longispina* (Chodat) Smith.**

Colonies consisting of 4 cells, arranged in a linear series; cells cylindrical, spines as long as to the length of the cells; cells 3.5-4.8 µ in diameter, 10-12.5 µ long, spines 9.8-12.5 µ long.

In a puddle (8.5), Hiwara pahadi (04-10-06); In a pond (8.5), Sonpeth road, Parli Vaijanath (05-12-06); In a Sindhaphana river (8.5), (03-11-07); In a stream (8), Raulasgaon (9-12-07).

***Scenedesmus quadricauda* (Turp.) de Breb. v. *maximum* West et West**

Colonies consisting of 4-8 cells; arranged in a linear series; cells 4-7.5 µ in diameter, 10.2-17.5 µ long, spines 12.5-17.5 µ long.

In a rock pool (9.5), Patoda (3-10-06); In a streamlet (8.5), Ookhanda (14-11-06); In a pool (8.7) Chausala (10-11-07).

***Scenedesmus quadricauda* (Trupin) de Brebisson v. parvus G.M Smith.**

Colonies consisting of 4 cells, arranged in a linear series; cells cylindrical; cells longer than broad, equal to the length of spines; outer cells with a long spine at each pole, inner cells without spines; cells 3-4.8 µ in diameter, 9.8-10.2 µ long, spines 7.5-10 µ long.

In polluted water passage (gutter) (8.7), Nagar road Beed (08-01-06) In pond (8.7), near Khandeshwari temple, Beed (10-02-07).

***Scenedesmus quadricauda* (Turpin) de Brebisson v. *quadrispina* (Chodat) G.M. Smith.**

Colonies consisting of 4 cells, arranged in a linear series; cells ovoid; about three times longer than broad; poles of terminal cells with small spines; cells 5.5-7 µ in diameter, 20-24.8 µ long, spines 10-11.5 µ long.

In a stream (8.5), Sautada (02-04-08); In a small pool (8.7) Majalgaon (24-12-07); In a pond (8.5), Kapildhar (17-12-08), In a river (8.5), Karpara (09-10-08).

***Scenedesmus quadricauda* (Turpin) de Brebisson v. *westii* G.M. Smith.**

Colonies consisting of 2 cells; cells oblong cylindrical with broadly rounded ends; cells 4.8-5 µ in diameter, 15.8-17-5 µ long, spines 9.8-10.5 µ long.

In a small pool (9), Wanjarwadi (08-01-06); In a Godavari river (8.5), Shahagadh (18-11-07); In a stream (8.7), Kapildhar, (09-12-07); In a cistern (8.5), Datta Nagar, Beed (05-12-08);

CONCLUSION:

In the present investigation genus Scenedesmus is represented by its 32 species with their 15 varieties and 1 forma.As far as seasonal variation concern the members of chlorococcales were found dominantly in the seasons of winter and followed by summer and commenly found in the range 8 to 8.7pH.The results are agreed with Ashtekar (1979), Anand (1975), Jose (1992)Jawale (2003)

REFRENCES:

Allen, W.E. (1920). A quantitative and statistical study of the plankton of the Son Joaquin river and tributaries in and near Stockton, California in 1913. *Publi 2001*.**22**: 1-297.

Anand, V.K. (1975). A check list of planktonic algae from Mansar lake, Jammu. *Phykos* **14(1 & 2):** 77-79.

Ashtekar, P.V. and Kamat, N.D. (1979b). Chroococcales of Aurangabad district, Maharashtra. *Marathwada Univ. J. Sic.***18(11):** 47-52.

Aykulu, G. (1978). A quantitative study of the phytoplankton of the river Avon Bristol Br. *Phykos J.* **13:**1 -102.

Barhate, V.P. and J.L. Tarar (1981). The algal flora of Tapi River, Bhusawal Maharashtra, *Phykos,***20:** 75-78.

Claus, G. and Reimer, C.W. (1961). A Quantitative and Qualitative study of the phytoplankton of the Danube River at Vienna. *Revista De Biologia***2(3-4):** 261-275.

Collins, F.S. (1928). Green algae of North America. G.E. Strechert and Co. New York

Dhane, J.S.(2013). On some Chlorococcales from hartalalake, district Jalgaon, Maharashtra. *International Journal of Recent Scientific Research*.**4 (2):**15-138

Dixit, S.C. (1937). The Chlorophyceae of the Bombay Presidency, India-I. *Ibid*.**5(1):** 16-25.

Fritsch, F. E. (1903). Observations of phytoplanktons of the river Tames, *Ann. Bot.***17**:631-647.

Hegde G.R. and Bharati, S.G. (1983). Freshwater algae of Bijapur district, Karnataka state, India. *Phykos.***22:** 167-170.

Jawale, A.K. and Kumawat, D.A. (2003). Some Chlorococales from fish ponds, Maharashtra. *J. Aqua Bio.* Vol. **18 (2):** 17-19.

Jena, M.and Adhikari S.P.(2008). Algal diversity in Rushikullya river, Orissa from origin till confluence to the sea. *Indian Hydrobiology*.**11 (1):**9-24

Jose, L. and Patel, R.J. (1992). A systematic account of Chlorococales new to Kerala. *Phykos*.**31 (1 & 2):** 95-102.

Jyothi, B and Venkateshwaralu, V. (1990). Ecological evaluation of Chlorococalean blooms-A comparative account. *J. Indian Botanical. Soc.***69:** 115-119.

Kamat, N.D. (1962). Chlorophyceae of Ahmedabad, India *Hydrobiologia.***20:** 248-279.

Kamat, N.D. (1974). Algae of Marathwada, Maharashtra. *Phykos***13:** 22-32.

Kamble, S.M. (2008). Studies on effect of bioactive compounds of algae on some fungi. Ph.D. thesis, Dr. B.A.M.U. Aurangabad.

Karande, C.T.and Jagtap, J.V. (1994). Systematic account of fresh water algae (Chlorococcales) of Satara, Maharashtra I.*Rayat Research Journal*.88-100

Kumar, R. and Rai, S.K. (2005). Contribution to the algal flora (Chlorophyceae) of Namchi, Sikkim-*Himalayas our Nature*.**3:**50-55

Kumar, R. and Suseela, M.R.(2012).Chlorophyceae of District Kangra of Himachal Pradesh.*Phycos*.**42 (2):**pp 35-38

Kumawat D.A. and Jawale A.K. (2004b). An Ecological study of chlorococcales in the Inland Fishery. *J. Phytol. Res.***17 (1):** 43-46.

Leghari, S.M. and Jahangir, T.M. (2001) Chlorococcales of Sindh, Pakistan. On line *Journal of Biological Sciences***1(6):**451-544

Patil, S.A. (2013). Genus Scenedesmus Mayen from Mangrul dam Dist.Jalgaon, Maharashtra. *Indian Journal of Fundamental and Applied Sciences*.**3 (2)** pp204-210

Tiwari, A.and Chauhan, S.V. (2007) Some rare chlorophycean species from Yamuna river at Agra.*Indian Hydrobiology*.**10(2):**237-244

Nandan, S.N. and Patel, R.J. (1986a).Algal flora of Vishwamitri river Baroda-II Chlorophyceae. *Indian Bot. Reptr*.**5(1):** 97.

Philipose, M.T. (1960). Fresh water phytoplankton of inland fisheries. *Proc. Symp Algology, ICAR.* 272-291.

Phllipose, M.T. (1967).Chlorococcales.*ICAR.*Monograph, New Delhi. **P**. 365.

Prescott G.W. (1951). Algae of the Western great lakes area. Granbrook Institute of Science, Michigan.

Sirsat D.B., Ambore N.E. and Pulle J.S. (2004). Study of Phytoplankton of fresh water pond at Dharnapuri in Beed District (M.S.) *J. Aqua. Biol.***19(2):** 7-10.

Smith, G.M. (1918). A Second list of algae found in Wisconsin Lakes. *Trans. Wisc. Acad. Sci. Arts. Lett.* **19:** 614-654, 6 Plts.

Unpapron,Y.Tipnee,S.andRameshbahadur,R.(2014).Biodiesel from green alga Scenedesmus.Scenedesmus.International Journal of Sustainable and Green Energy.**4(1-1):1-6**