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Original Research Paper

Isolation, Morphological Characterization and Growth Assessment of Indigenous *Scenedesmus obliquus* for Enhanced Microalgal Biomass Production

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Key Words

Scenedesmus obliquus; freshwater microalgae; strain isolation; morphological characterization; growth kinetics; OD_{750}; dry cell weight; biomass productivity

Abstract

Microalgae have emerged as environmentally friendly agents for the production of biomass due to their ability to grow fast, their efficient photosynthetic process, and the capability to accumulate biomass under favorable growth conditions. The current study aimed to isolate, purify, and identify the indigenous freshwater strain of *Scenedesmus obliquus* obtained from the natural sources in the Mahendragarh district, Haryana. The environmental samples of water were collected from selected freshwater source, and the samples were enriched, diluted, spread, and sub cultured to obtain the isolate. The isolated strain was cultured in BG-11 medium in laboratory conditions and then characterized using light microscopes and scanning microscopy. The growth performance of the strain was tested for 14 days by measurement of the OD at 750 nm, while biomass production was estimated using the dry cell weight (DCW) method. The biomass productivity was estimated based on the changes observed in dry biomass during the process of cultivation. The isolated *Scenedesmus obliquus* showed the specific non-motile coenobial type of formation which corroborated its morphological identification. The culture showed good growth over 14 days and attained a peak OD_{750} of 0.130 with a maximum dry cell weight and productivity of 2.8 g L^{-1} and 0.4 g L^{-1} day^{-1}. Changes in biomass productivity over the period revealed a parallel change in the rate of biomass accumulation. The results confirm isolation and initial identification of an *indigenous Scenedesmus obliquus* strain and provide the foundation for further optimization of the culture conditions in terms of biomass productivity and implications for sustainable biotechnological applications.

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1. Introduction:

Microalgae have emerged as significant microorganisms for their potential use as biological agents for sustainable biomass production and in many biotechnological and ecological applications. The most important aspect of microalgae relates to their ability to transform light energy into chemical energy, to use inorganic carbon sources, and to yield biomass sufficiently fast in fairly short cultivation cycles (Calatrava et al., 2024). Researchers have worked with microalgal biomass in order to find its possible applications in the field of biofuels production, obtaining bioactive compounds, food and feed additives, wastewater treatment processes, carbon consumption, as well as in other processes related to biorefinery (Sivaramakrishnan et al., 2022). Nevertheless, the successful realization of microalgal biotechnology greatly depends on the selection of appropriate strains, as well as on ensuring sufficient biomass productivity under certain cultivation conditions (Kryvenda et al., 2023). Recent studies have shown the productivity achieved during laboratory testing may not apply to large-scale cultivation, thus bringing into the limelight the need to pay attention to strain selection and to studying the growth characteristics of various strains in a systematic fashion (Alzahmi et al., 2024).

Among various freshwater green microalgae, *Scenedesmus obliquus* is of great interest due to its unique growth properties, metabolic plasticity, and ability to produce biomass. The distinctive morphological characteristic of this species is the formation of non-motile coenobial consisting of cells (Cho et al., 2024). The species *Scenedesmus obliquus* has been investigated in terms of biomass synthesis, nutrient utilization, potential applications in the environment, and production of valued cell components (Silkina et al., 2025). Recent experiments have investigated the growth kinetics and productivity of *Scenedesmus obliquus* under various cultivation conditions, which proves that cultivation parameters can widely change growth efficiency (Silveira Júnior et al., 2025).

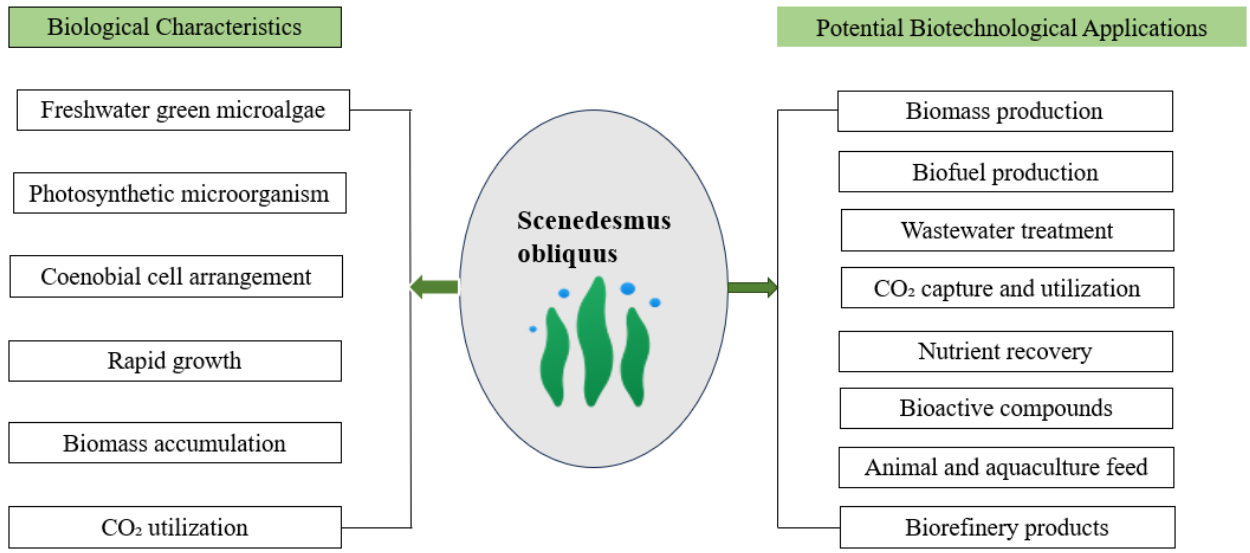


Figure 1. Biological characteristics and potential biotechnological applications of *Scenedesmus obliquus*.

The environmental and nutritional factors such as light, temperature, pH, nutrient concentration, carbon source, inoculum density, and cultivation system can affect *Scenedesmus obliquus* productivity. It is worth mentioning that just strain selection is not enough for high biomass production, but one should also characterize the physiological reaction of this strain under actual cultivation conditions. The latest investigations show that cultivation condition modification leads to an increase in biomass production and other valuable features of the biomass of *Scenedesmus obliquus* (Silveira Júnior et al., 2025). The possible application of nutrient-rich wastewater systems for the cultivation of S. obliquus is a good example of

biomass production enhancement and nutrient recycling (Silkina et al., 2025).

The first consideration in choosing a strain is its origin. Indigenous microalgae, which can be found in local natural broad freshwater areas, are likely to possess physiological features that allow them to adapt to the corresponding conditions (Umetani et al., 2023). Thus, isolation of native strains followed by initial screening can be a useful technique that can help in the selection of organisms that are able to grow consistently in laboratory conditions. These techniques are of great importance when the goal is to select locally obtained strains for further optimization and biomass-formation studies (Lee et al., 2022).

Morphological characterization is the first step to identifying freshwater microalgae. Members of the genus Scenedesmus can be identified based on the features like the shape of cells, arrangement of cells, organization of colonies, structure of cell walls, and structure of terminal cells. Light microscope is used to examine these features, while scanning electron microscope (SEM) provides more detail about cellular and colonial morphology (Jang et al., 2025). A correct initial identification is essential when performing strain-selection studies since the growth features and biochemistry of similar algae can vary greatly. (Akgul et al., 2017).

Assessment of microalgal development requires the use of effective quantitative measures. To quantify changes in microalgal density during cultivation, the optical density technique can be employed. Measurements at the wavelength of 750 nm (OD_{750}) have been used conventionally for monitoring the progress of microalgae cultures while keeping the influence of pigment-related absorption to a minimum. The drawback of the optical density is that it does not provide a direct measurement of biomass and can be influenced by cell dimensions, shape, and clumping, and changes in light refraction. Therefore, measuring dry cell weight (DCW) directly is an essential complementary measure in determining biomass concentration. Combined use of OD_{750} and DCW will provide a more accurate estimation of biomass accumulation and help to relate optical measurements to actual biomass production (Choe et al., 2025)

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Recent studies have also pointed out the necessity of kinetic measurements in the analysis of the *Scenedesmus obliquus* culture. Growth rate, biomass concentration, and productivity of biomass provide different information about microalgal culture, so they need to be evaluated together and not only rely on the main biomass accumulation. A recent study specifically evaluated kinetic parameters and yield of *Scenedesmus obliquus* under different cultivation conditions, reinforcing the importance of quantitative growth assessment for strain evaluation (Jin et al., 2024).

Although *Scenedesmus obliquus* has been extensively investigated for different biotechnological applications, the characterization of indigenous strains from specific freshwater environments remains relevant because strain performance can vary according to environmental origin and cultivation conditions. Furthermore, preliminary isolation studies that integrate morphological characterization with systematic growth monitoring can provide the foundation for subsequent optimization experiments. This is particularly important for identifying locally occurring strains before investigating the effects of environmental and nutritional parameters on biomass productivity (Khatiwada et al., 2025).

In conclusion, the focus of the study was on isolating, purifying, morphologically identifying, and growing an indigenous strain of *Scenedesmus obliquus* from **freshwaters of Mahendragarh district, Haryana, India.** The strain was studied through light and scanning electron microscopy and was grown in BG-11 medium under controlled laboratory circumstances. The growth of the strain was measured for a period of fourteen days as OD_{750}, while dry biomass was measured for biomass productivity. This study was intended to provide the primary growth characteristics of *Scenedesmus obliquus* , as well as the basis for optimizing growth conditions for microalgae cultivation.

2. Materials and methods:

The present study consisted of collecting samples of freshwater from Mandola village, Mahendragarh district, Haryana, India, followed by enrichment, isolation, purification, and

morphological screening of indigenous microalgal isolates. Based on the characteristics of morphology, the selected isolate was identified as *Scenedesmus obliquus* and subsequently tested for growth and biomass production under laboratory conditions. The overall experimental workflow is illustrated in **Figure 2**.

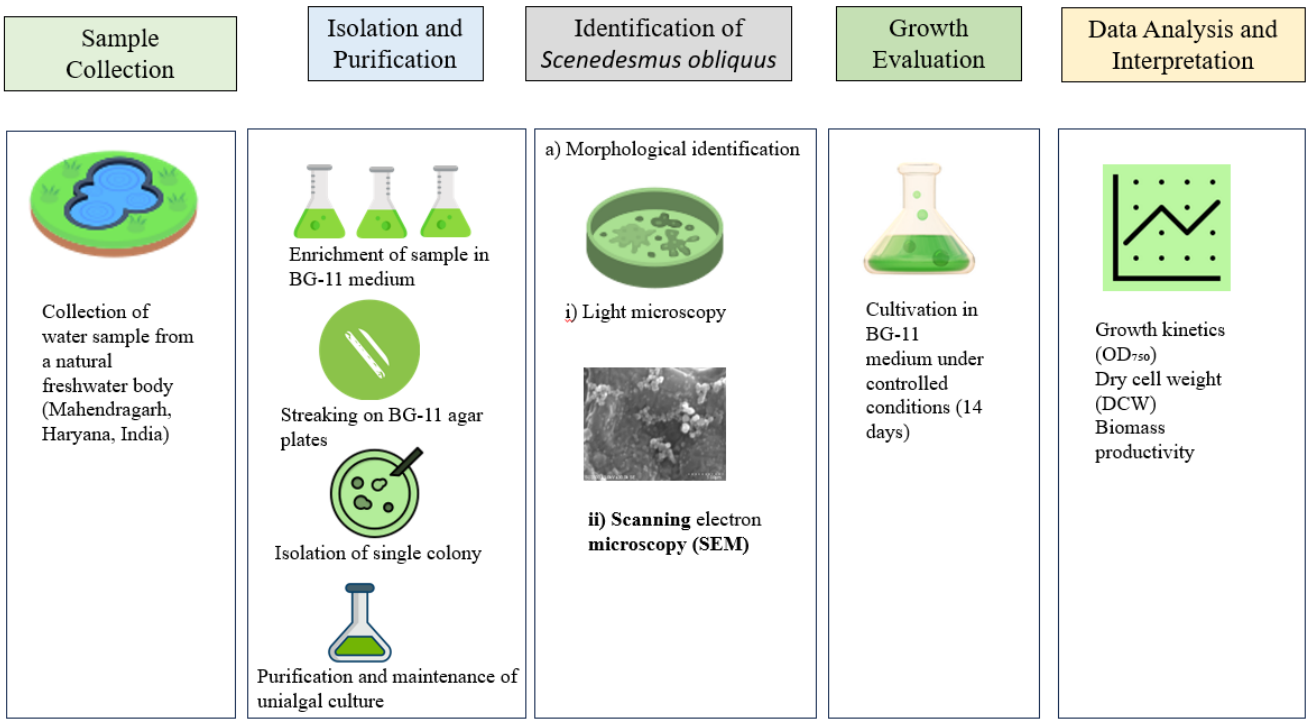


Figure 2. Experimental workflow for the isolation, identification, and growth evaluation of *Scenedesmus obliquus*.

2.1 Study Area and Sample Collection

A water sample was gathered from a chosen water body in Mahendragarh district in Haryana, India, to isolate indigenous strains of microalgae. Water was drawn from Village Mandola Pond to gather a sample of naturally occurring freshwater microalgae **(Figure 3)**. Samples were collected in sterile sample containers carrying corresponding labels based on their site of collection. After collection, the samples were transported to the laboratory and refrigerated for processing purposes in microalgal enrichment and isolation.

The sampling strategy was devised to get natural microalgae and isolate those capable of exhibiting appropriate morphological and growth characteristics for further studies.

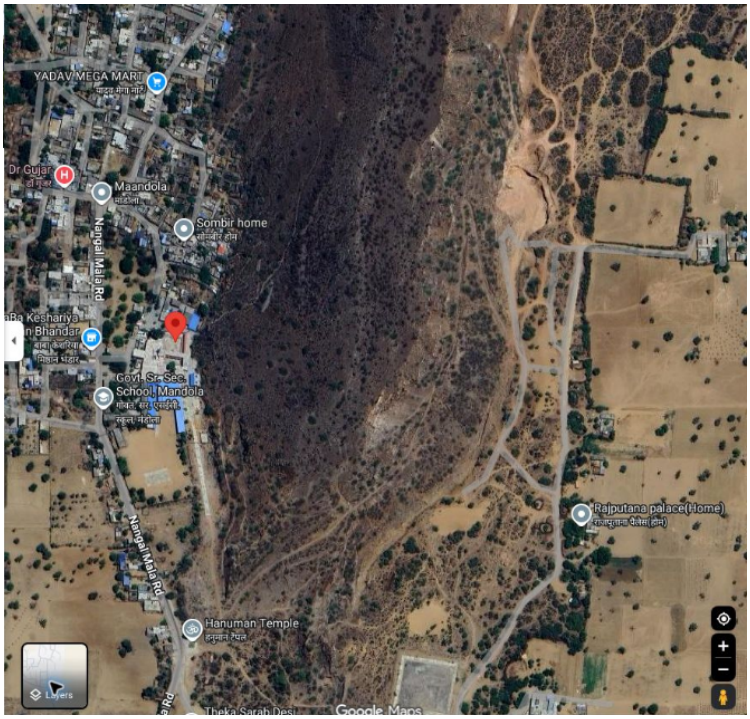


Figure 3. Location of freshwater sampling site selected for isolation of *Scenedesmus obliquus* in Mandola Pond, Mahendergarh district, Haryana, India (by google map).

2.2 Enrichment of Microalgal Samples

The enrichment culture of the collected freshwater sample was made to support the natural growth of microalgae. Each sample (10-20 mL) of freshwater environment was inoculated into 100 mL of BG-11 broth under sterile conditions. The enrichment cultures were maintained under controlled laboratory conditions of approximately 25+/-2°C with a photoperiod of 16:8 h at a light intensity of 2000 to 3000 lux. The observation of cultures under the microscope was made at regular intervals to monitor the growth of microalgae that resembled Scenedesmus in morphology.

2.3 Preparation of BG-11 Medium

BG-11 medium was prepared following the process outlined by Stanier et al. (1971). A mixture for a litre of BG-11 medium includes the following components: 1.5 g of sodium nitrate ($NaNO_3$), 0.04 g of dipotassium hydrogen phosphate (K_2HPO_4), 0.075 g of magnesium sulfate heptahydrate ($MgSO_4 \cdot 7H_2O$), 0.036 g of calcium chloride dihydrate ($CaCl_2 \cdot 2H_2O$), 0.006 g of citric acid, 0.006 g of ferric ammonium citrate, 0.001 g of disodium ethylenediaminetetraacetate (Na_2EDTA), and 0.020 g of sodium carbonate (Na_2CO_3). All of these components were dissolved in distilled water to prepare BG-11 medium.

The A5 trace-metals stock solution was added to the medium at a dose of only one millilitre per litre of medium. The concentration of the trace metals in the A5 stock is: 2.86 g L^{-1} boric acid (H_3BO_3), 1.81 g L^{-1} manganese chloride tetrahydrate ($MnCl_2 \cdot 4H_2O$), 0.222 g L^{-1} zinc sulfate heptahydrate ($ZnSO_4 \cdot 7H_2O$), 0.390 g L^{-1} sodium molybdate dihydrate ($Na_2MoO_4 \cdot 2H_2O$), 0.079 g L^{-1} copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$), and 0.0494 g L^{-1} cobalt nitrate hexahydrate [$Co(NO_3)_2 \cdot 6H_2O$]. Then, distilled water was added to make a volume of one litre in the end.

The pH was modified to about 7.1 with the dilute NaOH or HCl. Subsequent sterilization of the medium was done through autoclaving at 121 °C and 15 psi for 15-20 min. As soon as the autoclaving was done, the medium was allowed to cool down without contamination before inoculating with the *Scenedesmus obliquus*. EDTA was kept aside as a chelator and this was not taken as a part of the A5 trace-metal mix.

2.4 Isolation and Purification of Scenedesmus obliquus

Isolation of the enriched culture containing microalgae was done by serial dilution, agar plate method, and micro pipetting technique. Serial dilution involves arranging the diluted enriched samples in sterile media and sterile distilled water. The most suitable dilutions were then inoculated onto BG-11 plates and incubated again.

The colonies of morphologically characterized individuals that represent *Scenedesmus* were chosen and aseptically transferred to fresh BG-11 medium. The cultures were regularly transferred until the microalgae were the same and pure. The purity of the cultures was checked by light microscopy. Any culture showing the same morphological characteristics without any contamination was chosen and used for further studies.

2.5 Morphological Characterization

Light microscopy was utilized to investigate the cellular and colonial morphology of the isolate of the selected microalgae after it was purified. Measurements were collected in order to evaluate various morphological parameters of the isolate, for example, cell shape, arrangement, organization of colonies, size and nature of chloroplasts, and terminal morphology of cells. Furthermore, the isolation was subjected to scanning electron microscopy techniques in order to obtain detailed images of its structural forms on both cellular and colonial levels. Having analyzed the obtained morphological data, its parameters were compared with those described in taxonomic literature on the genus Scenedesmus so as to confirm that species identification of the microalgal isolate could be preliminary, and the species of the isolate could be rather defined as *Scenedesmus obliquus*.

2.6 Cultivation of Scenedesmus obliquus

After purification and establishing the morphology of the isolates, the chosen strain of *Scenedesmus obliquus*was transferred into new BG-11 growth medium. The incubation descriptors were maintained at controlled laboratory condition at temperatures around 25 ± 2 °C, a photoperiod of 16 hours of light and 8 hours of dark with an intensity of original light sources of around 2000-3000 lux. The cultures were monitored for growth over 14 days, during which the growth was conducted using optical density measurements through regular intervals.

2.7 Growth Measurement by Optical Density

Assessment of the growth of *Scenedesmus obliquus* was culture was done by determining optical density (OD) at 750 nm wavelength with UV–visible spectrophotometer. Cultures were thoroughly mixed before the measurement to keep the cells evenly spread. The proper volume of the culture was taken into a cuvette, and absorbance was measured at a wavelength of 750 nm with the corresponding culture medium as a reference. The measurements of OD were taken throughout the period of cultivation of 14 days. Data acquired from the OD values were used for constructing a growth curve and determining the effects of cultivation time on culture density. The increasing OD values indicated an increase in biomass concentration and were evaluated together with dry cell weight.

2.8 Dry Cell Weight Determination

Dry cell weight value was obtained to measure the biomass concentration of the culture of *Scenedesmus obliquus*. For determination of DCW, a known volume of culture was collected through centrifugation, followed by separation of microalgae biomass from the culture medium. The biomass collected was washed with distilled water to get rid of any salts or materials left after collection. The biomass was then place in a pre-weighed container for drying in the oven until constant weight was achieved. Dry biomass is calculated by getting the difference between the final weight and initial weight. Biomass concentration was calculated as:

DCW (g L^{-1}) = Dry biomass obtained (g) / Volume of culture harvested (L)

The DCW values were used to quantify biomass concentration and to support understanding of the OD_{750} growth measurements (Gupta and Marchetti (2024).

2.9 Biomass Productivity

Biomass productivity was calculated from the change in dry biomass concentration over the cultivation period.

The biomass productivity was calculated using: $P = (X_2 – X_1)/ t_2- t_1$

where:

- P = biomass productivity (g L^{-1} day^{-1})
- X_2 = DCW at the current day (g L^{-1})
- X_1 = DCW at the previous day (g L^{-1})
- $t_2 – t_1$ = time interval between the two measurements (days)

The calculated productivity values were used to determine variations in the rate of biomass accumulation during *S. obliquus* cultivation (Gupta and Marchetti (2024).

3. Results and discussion:

3.1 Isolation and Purification of Microalgal Isolate

An environmental water sample obtained from freshwater habitat of Mandola village, Mahendragarh district revealed the presence of different naturally occurring microalgal species after enrichment in BG-11 medium. An observation of microalgal occurrence strongly proves that the selected environmental conditions are conductive to the growth of native freshwater microalgae. Microalgae were obtained by applying the methods of serial dilution, plating and repeated subculturing. Distinctive colonies were obtained depending on the morphological characteristics, and they were transferred to BG-11 medium for further observation and growth. Repeated subculturing made it possible to obtain cultures of microalgae of stable characteristics.

Microscopic study of the selected microalgae showed stability of both cellular and colonial morphology. The purified isolate was subjected to detailed morphological studies by light microscopy and scanning electron microscopy. The obtained results demonstrate the role of enrichment in stable culture development from the samples of the environment. The morphological characteristics of the obtained isolate corresponded to those of the representatives of the genus Scenedesmus.

3.2 Morphological features of isolated microalgae:

Morphological characterization of the isolated microalgal strain was performed using light and scanning electron microscopy. The inquiry with the light microscope revealed the unique cellular organization, while the application of SEM allowed us to visualize the external morphology of the microalgal isolate in detail. The results of the SEM obtained with different magnification levels revealed the presence of cell structure elements characterized by juxtaposition and separation of the cells. At the same time, the outer surface of the cells appeared irregular, represented by ridges, folds, and depressions.

Thus, the combined outcomes of the investigation show typical morphological properties corresponding to the genus Scenedesmus, which shall lead to the determination of the chosen strain as *Scenedesmus obliquus*. The same methodology has been used in relation to the native species known as *Tetradesmus obliquus* (currently labelled according to the nomenclature used for S. obliquus by many researchers), while in most recent discoveries of *Tetradesmus obliquus*, molecular markers have been used for more precise identification. The authors performed rbcL gene sequencing in the investigation by Ahiahonu et al. (2022).

The results obtained under the light microscope and the scanning electron microscope used in the present study give morphological evidence for the identification of the isolate as *Scenedesmus obliquus*. However, application of the process of molecular characterization through the use of relevant genetic markers would provide the solid taxonomical proof in further studies.

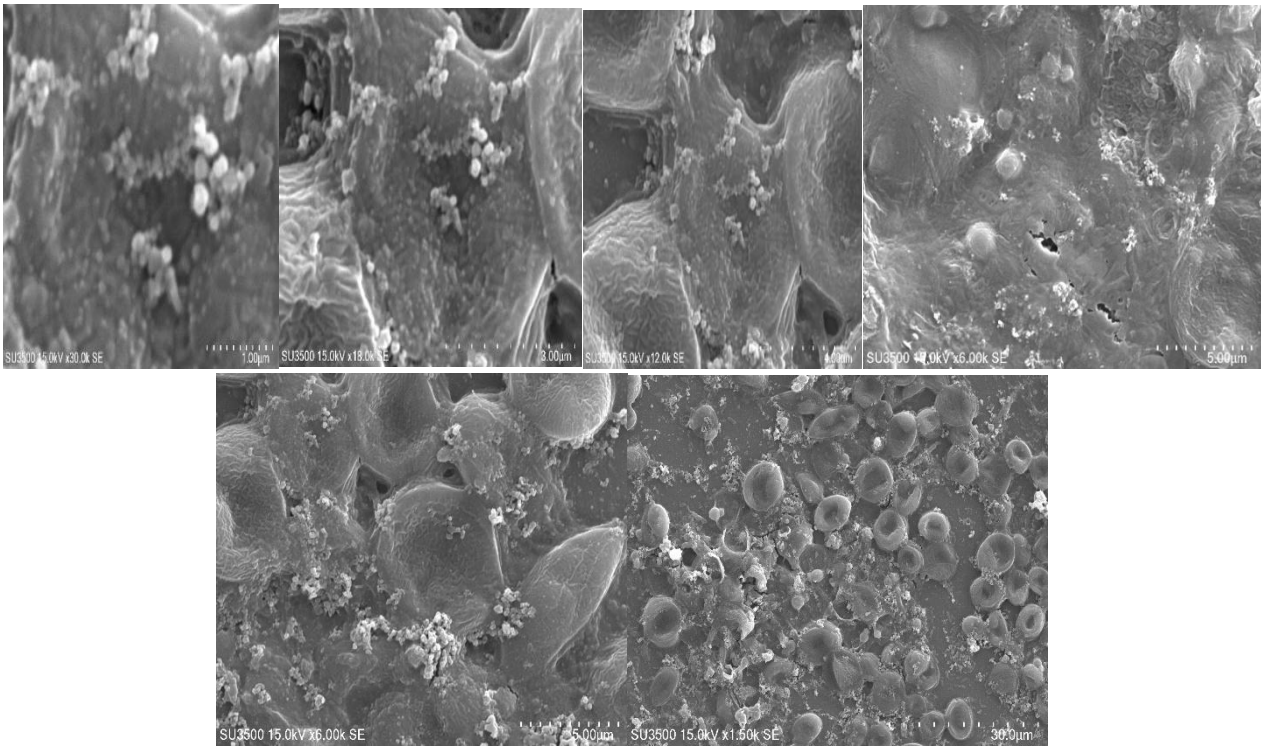


Figure 4. Scanning electron micrographs of the morphologically identified *Scenedesmus obliquus* isolate showing cellular organization and surface morphology at different magnifications

3.3 Growth Kinetics of *Scenedesmus obliquus*

The investigation of the growth performance characteristics of *Scenedesmus obliquus* utilized OD_{750} measurement, which was conducted over a 14-day culture period. The OD_{750} values were found to increase progressively during the growth period of the culture, verifying that the culture was growing under BG-11 growth conditions. Ultimately, the highest OD_{750} value recorded during Day 14 was equal to 0.130.

During the initial growth period of the culture, the comparatively slow increase of the optical density indicates that the cells were getting adapted to the conditions of the environment. The pronounced increase in cell density happened during the active growth stage of the organism. The increase in growth rate started slowing down in the later periods of the cultivation cycle, indicating a possible approach to the stationary phase. This can be attributed to the possible gradual decrease of nutrient availability, an increase in the cell density of the organism, self-shading, decreased light availability, or change of factors of the physicochemical environment of the culture.

Experimentation has proven that growth kinetics of *Scenedesmus obliquus* is reliant on conditions of cultivation. According to Silveira Júnior et al. (2025), significant differences are observed in maximum cell density and other kinetic factors of *Scenedesmus obliquus* due to changes in factors like nutrient concentrations, temperature, and pH. In this way, impact of cultivation environment on growth effectiveness is evident. Thus, the obtained increase of OD_{750} in the conducted research suggests successful growth of isolated *Scenedesmus obliquus* under laboratory conditions. However, as optical density is an indirect measurement of culture density, biomass accumulation was assessed through dry cell weight.

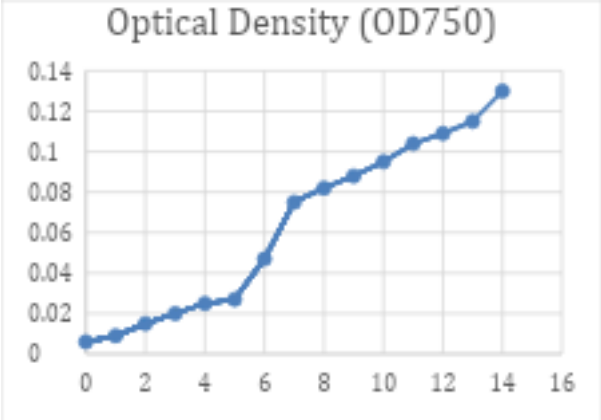


Figure 5. Growth profile of *Scenedesmus obliquus* based on optical density at 750 nm (OD_{750}) during the 14-day cultivation period.

3.4 Biomass Accumulation of *Scenedesmus obliquus*

The evaluation of dry cell weight (DCW) during growth was carried out in order to measure the biomass buildup associated with *Scenedesmus obliquus*. The biomass concentration increased due to the increase in cultivation time, indicating gradual biomass production under the chosen experimental conditions. The maximum DCW of 2.8 grams/liter was obtained during the cultivation of the culture. The biomass value observed is particularly interesting when compared with information on *T. obliquus* in literature. Thus, Ahiahonu et al. (2022) achieved maximum biomass concentration of 2.78 ± 0.019 g L^{-1} for indigenous *T. obliquus* UJEA_AD strain grown in photoautotrophic conditions in BG-11 medium for 16 days. The biomass concentration produced in this study (2.8 g/liter) matches the amount produced by UJEA_AD strain, even though the conditions for cultivation and strain origin were different.

As indicated by the comparison, there exists a significant variation between each of the studied strains since the same publication reports the earlier findings of around 0.68 g L^{-1} for *T. obliquus* NEIST BT-A1 and 1.84 g L^{-1} for *T. obliquus* SJTU-3. This exemplifies that the values for biomass accumulation differ from species to species and should be viewed in relation to the properties of the strain, inoculum size, cultivation time, nutrient availability, carbon concentration, pH, light conditions, and other factors of the study. Thus, the maximum DCW of 2.8 g L^{-1} achieved in this research confirms considerable biomass accumulation achieved by the studied strain during the lab experiment. At the same time, comparisons between studies must be approached cautiously since different experimental designs can considerably affect the final biomass value obtained.

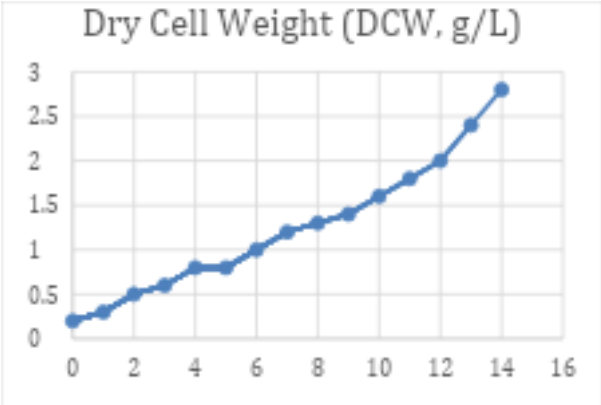


Figure 6. Dry cell weight (DCW) of *Scenedesmus obliquus* during the 14-day cultivation period.

3.5 Relationship Between Optical Density and Dry Cell Weight

The analysis of the relationship between optical density (OD_{750}) and dry cell weight (DCW) was conducted to establish whether the increase in density of culture coincides with the actual increase in biomass of *Scenedesmus obliquus*. The two factors showed similar trends throughout the period of cultivation showing that biomass was progressively accumulating under the selected growth conditions. Upon the further cultivation, the increase in OD_{750} has been accompanied by the increase in dry cell weight. This positive relationship implies that an increase in OD_{750} indicates the increase in biomass of cells as opposed to merely the change in optical properties of the culture. Thus, OD_{750} proved to be a good non-destructive parameter that can be used for monitoring the cultivation of the isolated *Scenedesmus obliquus* culture.

However, it is worth mentioning that optical density is an indirect measurement which can be influenced by a number of factors including cell size, shape, aggregation and light scattering. This aspect is important in case of *Scenedesmus obliquus* because it can show some typical features in terms of cell association. Therefore, the direct measurement of dry weight of a cell is the additional important measurement to verify biomass accumulation during cultivation processes. The simultaneous increase in OD_{750} and DCW noted in the study indicates the presence of a correlation between monitoring using a spectrophotometer and mass measurement of biomass. The establishment of such correlation is important for future studies, since the monitoring of process can be done with the help of OD_{750}, whereas DCW can be used for the quantitative assessment of biomass concentration.

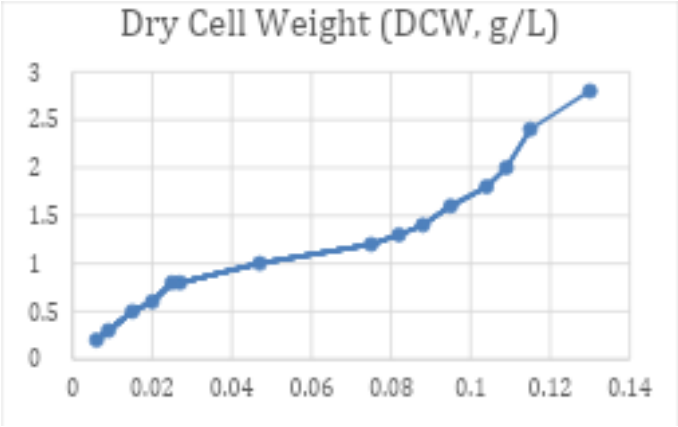


Figure 7. Relationship between optical density at 750 nm (OD_{750}) and dry cell weight (DCW) of *Scenedesmus obliquus* during cultivation.

3.6 Biomass Productivity of *Scenedesmus obliquus*

The quantification of biomass productivity was planned to identify the kinetics of biomass generation in cultures of *Scenedesmus obliquus*. Biomass productivity was found to differ during cultivation phases, as it varies in accordance with biomass generation at that cultivation stage of the culture. Maximum productivity as noted in this research paper is 0.4 g L^{-1} day^{-1}.

Review of findings of earlier literature confirms that biomass productivity of the strains of *S. obliquus/T. obliquus* can greatly differ and in particular, Ahiahonu et al. (2022) reported productivity of 0.153 ± 0.001 g L^{-1} day^{-1} for *T. obliquus* UJEA_AD cultivated photoautotrophically in BG-11 medium. The same study specified productivity values of approximately 0.18 and 0.155 g L^{-1} day^{-1} for the culture strains NEIST BT-A1 and SJTU-3, respectively. Another investigation involving the use of CO_2 from biogas as a source of carbon indicated a maximum S. obliquus biomass productivity of 0.145 g L^{-1} day^{-1} (Thiansathit et al., 2015). The calculated maximum productivity of 0.4 g L^{-1} day^{-1} in this research study is a greater value compared to all previous reports. However, it is important not to consider this as an advantage of the strain being studied because productivity depends on many factors: calculation duration, the initial and

final biomass concentrations, cultivation period, carbon source, light intensity, nutrient conditions, inoculum amount, and cultivation system.

The fact that the values of DCW differ shows clearly that biomass productivity and biomass grown represent two independent aspects of culture characteristics. Indeed, DCW gives an idea of the biomass produced, while biomass productivity defines the process of biomass formation for a certain period of time. So the point of greatest productivity could be useful to determine the suitable harvesting moment for biomass cultivation.Overall, the biomass accumulation and productivity results demonstrate promising cultivation performance of the isolated of *Scenedesmus obliquus* under the investigated conditions. Further controlled optimization of environmental and nutritional parameters would be necessary to determine whether the observed productivity can be consistently maintained or enhanced.

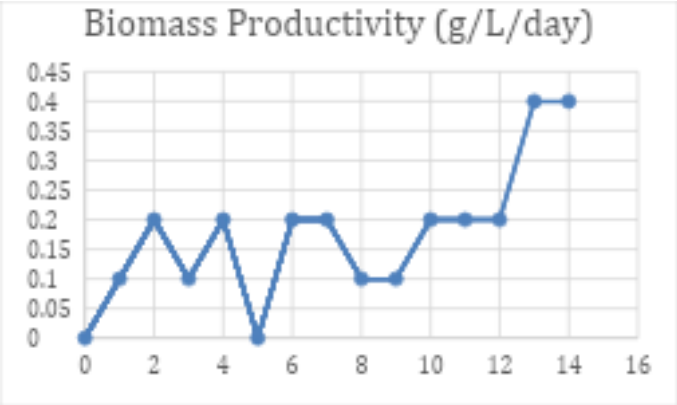


Figure 8. Biomass productivity of *Scenedesmus obliquus* during the 14-day cultivation period.

4. Conclusion

The current research conducted the isolation, purification, and morphological characterization of a local microalgal isolate from freshwater sites Mandola village in the Mahendragarh region, Haryana, India. The light microscopy and scanning electron microscopy methodology helped in the morphological identification of the selected isolate as *Scenedesmus obliquus*. Microscopic observations facilitated an understanding of the cellular arrangement and surface morphology of the isolate and helped in its morphological identification under the genus Scenedesmus. The isolated strain of *Scenedesmus obliquus* was able to grow considerably under the BG-11 cultivation process. The isolated strain of *Scenedesmus obliquus* grow continuously and increased its biomass under the BG-11 cultivation process. The maximum obtained optical density was 0.130; the maximum dry cell weight was 2.8 g L^{-1} and maximum biomass productivity was 0.4 g L^{-1} day^{-1} during the 14-day cultivation period. The observed results allowed to evaluate the baseline cultivation characteristics of the isolated strain and to create a perspective for further studies of its optimization. The results can prove the necessity of combination of the spectral monitoring of microalgae growth and direct measurement of biomass for assessment of the cultivation efficiency. Recent studies also indicate that the cultivation performance of *Scenedesmus obliquus* is greatly affected by the environmental conditions, such as light mode, the availability of nutrients in the medium, temperature, etc.

Hence, the future research needs to be directed towards the systematic optimization of several parameters such as pH, temperature, light intensity, nutrient concentration, and carbon availability, along with biochemical and molecular analysis of the isolated strain. Such studies would help determine the suitability of the isolated strain for larger-scale biomass production and subsequent environmental or biotechnological applications.

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