

Quantum Health Accelerator®: A Novel Choice for Enhanced Growth of Microalgae; *Arthrospira platensis* and *Chlorella vulgaris*

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<https://doi.org/10.22067/jam.2026.97720.1476>

Abstract

Microalgae are a salient source of oxygen and food for the living world. Every factor that could improve the growth rate and production of these valuable organisms could be a potential approach to achieving sustainability for humans. Microalgae such as *Chlorella* and *Arthrospira* (*Spirulina*) act as efficient organisms in collecting sunlight energy and converting it into biomass and biochemical compounds. In this investigation, we aimed to evaluate the effects of water (Quantum Health Accelerator®-QHA) enriched with vital bio-quantum information/energy, referred to here as Energetic Water (EW), on biomass production, biochemical composition/content, and morphological characteristics of these two agriculturally significant microalgae. The tested accelerator (EW) was applied in BG11 and Zarrouk culture media for the abovementioned microalgae in different versions, made respectively by treated distilled water (EW), non-treated distilled water (Control), filtered energetic water (FEW), and autoclaved energetic water (AEW). Biomass production, biochemical composition/content, and also morphological characteristics of these two microalgae were regularly recorded. The results surprisingly revealed a significant morphological change, together with significant changes (mostly two or three times more than the control) in biomass, pigments, proteins, and cell volume, and simultaneously a higher specific growth rate ($P < 0.05$) after applying the quantum accelerator, and demonstrated that the real effect of this treatment is working and could be economically exploited in algae cultivation.

Keywords: Biomass, Bio-Quantum Enriched Water, Growth Rate, Microalgae

Introduction

Microalgae represent a remarkably diverse group of organisms that thrive in a wide range of habitats, including freshwater and marine ecosystems. Their exceptional efficiency in capturing solar energy and converting it into photosynthetic products and biochemical compounds results in a significantly higher production rate compared to plants (Becker, 2013; Wang, Hu, Wang, Stiles, & Liu, 2014). Furthermore, their substantial content of valuable biomolecules (such as proteins, carbohydrates, pigments, and lipids) establishes microalgae as a premium raw material for

numerous sectors, including the pharmaceutical, cosmetic, food, feed, and biofuel industries. They contain a lot of water, about 80 to 99 percent of their fresh weight (Brennan & Owende, 2010), and their growth is highly dependent on water. The commercial culture of microalgae is now over 30 years old, with the main microalgae such as *Arthrospira* (*Spirulina*) and *Chlorella* (Camacho, Macedo, & Malcata, 2019). The global microalgae products market is valued at about USD 0.8 billion (2024), which is only a small fraction (less than one percent) of the algae trading business, including both macroalgae

(seaweeds) and microalgae markets (<https://www.fortunebusinessinsights.com/microalgae-market-110314>).

Finding any efficient factor or treatment for increasing food production or health-related products could revolutionise human life. Many research projects are required to investigate and evaluate new approaches for utilising new sources of energy or related equipment for this goal. Water as a medium could be enriched with vital bio-quantum information using a cosmic resonator (international application code: PCT/IB2019/053287). The Quantum Health Accelerator® (QHA) or Energetic Water (EW), prepared by the American Quantum Food Supplements Trading L.L.C. (License No.1090645, UAE), is employed in this investigation. According to the patent, the enriched distilled water, which had no added minerals or materials, receives quantum waves and vibrations that can be transferred to any object at specific frequencies.

Transferring bio-quantum information to water was according to the technology developed by Fibonacci carbon units, which can potentially absorb and retain the vital bio-quantum frequencies from nature. These frequencies can then be transferred to enrich water (Balázs, 2016; Chaplin, 2001; Davies, 2004; Podgornik, 2011; Steelman *et al.*, 2023), and the level of energy can be measured using the ElectroPhotonic Imaging (EPI) technique based on the Kirlian effect (Alipal, Lee, & Farzamnia 2017). These frequencies are specifically transmitted through water, and that is why the treated water is called “Energetic Water”. The treated water could work as a quantum accelerator and activate life, health, or any biological processes in a living organ or organism. According to Smith (2004), who described coherence effects in water and living systems using quantum mechanical models, the measurement of frequencies imprinted in water is referenced. The author suggests that water and living systems have macroscopic quantum properties that can give rise to a memory for frequencies, long-range effects, and entanglement between separated systems.

In the previous study of Mohaddes *et al.*

(2025), they demonstrated that QHA works as an anti-arthritis factor, potentially through its anti-inflammatory, anti-oxidative and immunomodulatory properties. This suggests that QHA has a promising therapeutic effect for treating Rheumatoid Arthritis. Following the authors’ studies, the main goal of this project was to conduct another biological test on water enriched with vital bio-quantum information (EW), which had no added minerals or chemical components, and to evaluate the enriched water to explore its biological effects on growth and biomass production, biochemical composition/content, and also morphological characteristics of two agriculturally significant microalgae species.

Materials and Methods

Energetic Water (EW) Preparation

According to the technology developed by Fibonacci carbon units, Quantum Health Accelerator® is prepared by the American Quantum Food Supplements Trading L.L.C. (License No.1090645, UAE). Three kinds of water, including non-treated distilled water, filtered-distilled water, and autoclaved-distilled water, were utilised to make four levels of QHA-EW treatment, including treated distilled water (EW), non-treated distilled water (Control), filtered energetic water (FEW), and autoclaved energetic water (AEW). The treated water did not receive additional nutrients, fertilisers, or growth-promoting chemical supplements during preparation. Furthermore, microbiological analyses performed by an accredited laboratory (Reihan Azma Iranian Laboratory- Registered 28135) confirmed the absence of detectable contamination.

Image-based analysis demonstrated measurable changes in different samples. In treated water (EW), the calculated image-energy parameter increased by more than 30%. This parameter is derived from image-processing algorithms and represents optical characteristics of the recorded images rather than direct measurements of physical or biological energy. Electrophotonic Imaging Analysis Using the Bio-Well GDV System can measure this parameter (Alipal *et al.*, 2017). To

further characterise potential differences between untreated and treated water samples, electrophotonic imaging analysis was performed using the Bio-Well GDV (Gas Discharge Visualisation) system developed by Konstantin Korotkov. This technology is based on the registration of photon and electron emissions generated when a sample is exposed to a brief, controlled, high-voltage electromagnetic pulse. This exclusive technology is currently in the process of being patented, and more details cannot be released.

Microalgae, growth measurements and biomass dry weight

The two microalgae strains used in this study, including *Chlorella vulgaris* (recognisable by code: MN628177 in NCBI gene database) and *Arthrospira platensis* (recognisable by code: MN638866 in NCBI gene database), were isolated in Ferdowsi University of Mashhad, Iran, by Khosravinia, 2019 (Khosravinia, Malekzadeh-Shafaroudi, Bagheri, Behdad, & Moshtaghi, 2024). *Chlorella vulgaris* and *Arthrospira platensis* were inoculated and grown in 400 mL of BG11 and Zarrouk media, respectively, with a photoperiod of 16 h light (100 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ intensity of fluorescent light): 8 h dark, at $25 \pm 2^\circ\text{C}$, and continuous shaking at 120 rpm. The microalgae were grown in BG11 and Zarrouk media made with the four above-mentioned waters as the experimental treatments.

The growth of each treatment was spectrophotometrically measured at an optical density (OD) of 680 nm, and biomass yield was determined through a filter, measuring a volume of 25 mL. It was carried out by the dry weight to constant weight method (48 h) at 40°C in an oven. Cell densities were monitored every few days using a light microscope and a haemocytometer counting chamber.

The peak and stationary phases were reached approximately on days 12 and 13th for *Chlorella* and *Arthrospira*, respectively. The cultures were harvested by centrifugation (8,000 rpm, 10 min) and subsequently freeze-dried (VaCo5, Germany) to a constant weight. The specific

growth rate (μ , d^{-1}) during these phases was calculated using the equation (1) (Wood, Everroad, & Wingard, 2005):

$$\mu = \frac{(\ln N_f - \ln N_0)}{t_f - t_0} \quad (1)$$

where N_f and N_0 represent the optical density at 680 nm (measured with a NanoDrop S2100SUV) at the final (t_f) and initial (t_0) time points, respectively. Biomass productivity (P , $\text{g L}^{-1} \text{d}^{-1}$) was then determined according to Griffiths and Harrison (2009) using the equation (2):

$$P = DM \times \mu \quad (2)$$

where DM (g L^{-1}) is the biomass yield.

Doubling time can also be calculated from the equation (3) (Dalgaard & Koutsoumanis, 2001):

$$Td = \ln(2) / \mu \quad (3)$$

Td : doubling time (h), and μ : specific growth rate (d^{-1}).

Analyses of biochemical components

The dried microalgae biomass was subjected to standard extraction protocols to quantify protein, lipid, and pigment content. Total protein was determined spectrophotometrically using the Folin phenol reagent, following the Hartree method (Hartree, 1972). Briefly, 10 mg of biomass was mixed with 8 mL of 0.5 M NaOH and incubated at 80°C for 10 min. After centrifugation, 0.5 mL each of 0.5 M sodium carbonate, 0.5 M sodium potassium tartrate, and 0.5 M copper sulphate, along with 2 mL of Folin-Ciocalteu reagent, were added to the supernatant. A calibration curve was constructed using varying concentrations of BSA (Bovine Serum Albumin).

For lipid extraction, approximately 100 mg of microalgae powder was processed using a modified Bligh and Dyer method. The cells were homogenised in an ultrasonic bath (SB-103D, 100 kHz) for 10 min with a chloroform:methanol:distilled water mixture (1:2:0.75, v/v). Following centrifugation, the supernatant was collected, and the cellular debris was re-extracted with the same solvent mixture until coloration disappeared. The combined extracts were filtered through 0.45 μm syringe filters and centrifuged at 10,000

rpm for 5 min. The lower organic phase was transferred to a pre-weighed vial and evaporated to dryness. Lipid content and productivity were then determined gravimetrically (Bligh & Dyer, 1959) using the equation (4):

$$\text{Lipid} = (WL / WA) \times 100 \quad (4)$$

where WL is the weight of the total extracted

lipids (g), and WA is the weight of dry biomass (g).

For pigment analysis, 1.5 g of microalgae was homogenised with 50 mL of methanol. After centrifugation, the supernatant was collected, and chlorophyll and carotenoid concentrations were quantified using the equations (5)-(7) described by Lichtenthaler and Wellburn (1983).

$$\text{Chlorophyll a } \left(\frac{\mu\text{g}}{\text{mL}} \right) (Ca) = (16.72 \times A665.2) - (9.16 \times A652.4) \quad (5)$$

$$\text{Chlorophyll b } \left(\frac{\mu\text{g}}{\text{mL}} \right) (Cb) = (34.09 \times A652.4) - (15.28 \times A665.2) \quad (6)$$

$$\text{Total carotenoid } \left(\frac{\mu\text{g}}{\text{mL}} \right) = \frac{(1000 \times A470) - (1.63 \times Ca) - (104.96 \times Cb)}{221} \quad (7)$$

For the estimation of C-phycocyanin (C-PC), allophycocyanin (APC), and phycoerythrin (PE) concentrations ($\mu\text{g mL}^{-1}$) using the equations (8)-(11), we used the Bennett and Bogorad (1973) method.

$$C - PC = \frac{A620 - (0.474 \times A652)}{5.34}$$

$$APC = \frac{A652 - (0.208 \times A615)}{5.09}$$

$$PE = \frac{A562 - (2.41 \times PC) - (0.849 \times APC)}{9.62}$$

$$\text{Total phycobiliprotein} = APC + PC + PE$$

Electron Microscopic Analysis

The isolated *A. platensis* and *C. vulgaris* microalgae, which were cultivated in control and EW treatments, were investigated with transmission electron microscopy (TEM). The studied cells were fixed in 3% glutaraldehyde in 0.1 mol L⁻¹ cacodylate buffer and also in 1% aqueous OsO₄ in 0.1 mol L⁻¹ cacodylate buffer, dehydrated in acetone and embedded in Spur resin. Ultrathin sections were stained with uranyl acetate and lead citrate (Reynolds, 1963). Electron micrographs were taken with a Tecnai12 (FEI) microscope, equipped with a Gatan CCD camera.

Statistical analysis

Two independent experiments were conducted in a completely randomised design

with three and five replications of *Arthrospira* and *Chlorella*, respectively. Analysis of variance was done using the JMP-9 software (John's Macintosh Project, USA) and expressed as mean $\pm$ standard error (SE). The LSD of Means (least-significant means differences by Student's t-test) was applied to assess the significant differences at 5% or 1% significance levels ($P < 0.05$ and 0.01 , respectively). According to the results of four different tested waters in the first experiment, the best water for enhancing biomass (i.e., EW) was chosen and tested in the same manner for calculating other parameters.

Results and Discussion

Test of water features and biological contamination in EW

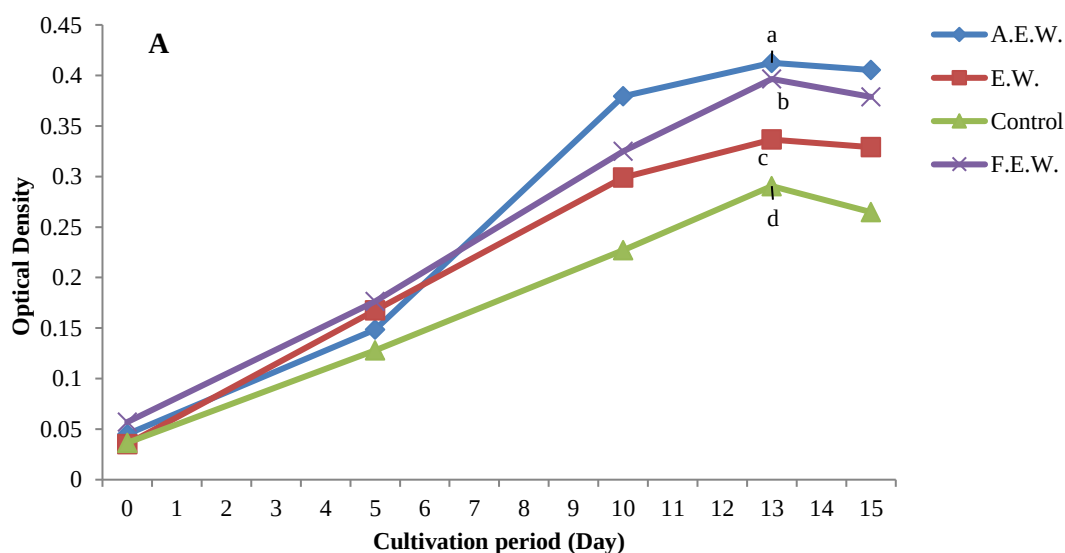
A replicated test of EW for fungal/bacterial contamination on a two-week culture on LB medium revealed no contamination in the samples. As recommended by the inventors of QHA, we avoided exposing light or any man-made waves or magnetic effects to all samples applied in this experiment by using aluminium covers and applying spacing considerations. Furthermore, microbiological analyses performed by an accredited laboratory (Reihan Azma Iranian Lab.- Registered 28135) confirmed the absence of any detectable contamination by *Escherichia coli*, *Pseudomonas aeruginosa*, Enterococci, and

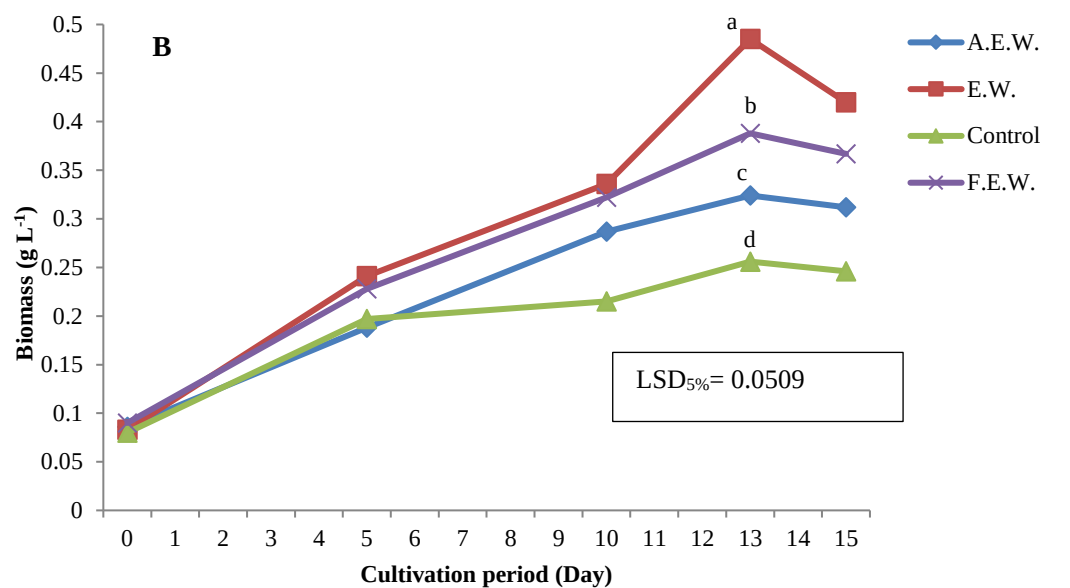
total coliform bacteria. Physicochemical evaluation also showed that the water remained within an acceptable quality range with a pH of approximately 7.3, turbidity of 0 NTU, nitrate concentration below 0.02 mg L^{-1} , nitrite concentration below 0.1 mg L^{-1} , and low levels of undesirable contaminants. These measurements indicate that the enhanced biological performance observed in the treated cultures cannot be readily explained by conventional nutrient enrichment or microbial effects. The water quality data also demonstrated stable physicochemical characteristics, including acceptable hardness, conductivity-related mineral composition, and low concentrations of potentially interfering substances. Such findings suggest that the biological responses may be associated with subtle modifications in water structure,

intermolecular organisation, dissolved gas behaviour, interfacial properties, or other physicochemical factors that were not directly investigated in the present study.

Growth measurements

Recent comprehensive studies revealed that the variation in biochemical components in microalgae depends on the species type, stage of growth, and the condition of the culture medium (Safafar *et al.*, 2016; Shin, Yip, Xu, Wong, & Cheung, 2008; Talebi *et al.*, 2013). The growth results of *A. platensis* and *C. vulgaris* cultivated in the control, EW, FEW, and AEW treatments are shown in Figures 1 and 2, respectively. The QHA-EW positively affected the growth parameters of microalgae. These parameters were lower in the control than in the other treatments ($P < 0.05$).





Source of variation (day 13 th)	df	SS	MS	F
Treatments (water)	3	0.06152	0.02050	28.0462
Error	8	0.00585	0.00073	P < 0.0001
Total	11	0.06737	-	LSD _{5%} = 0.0509

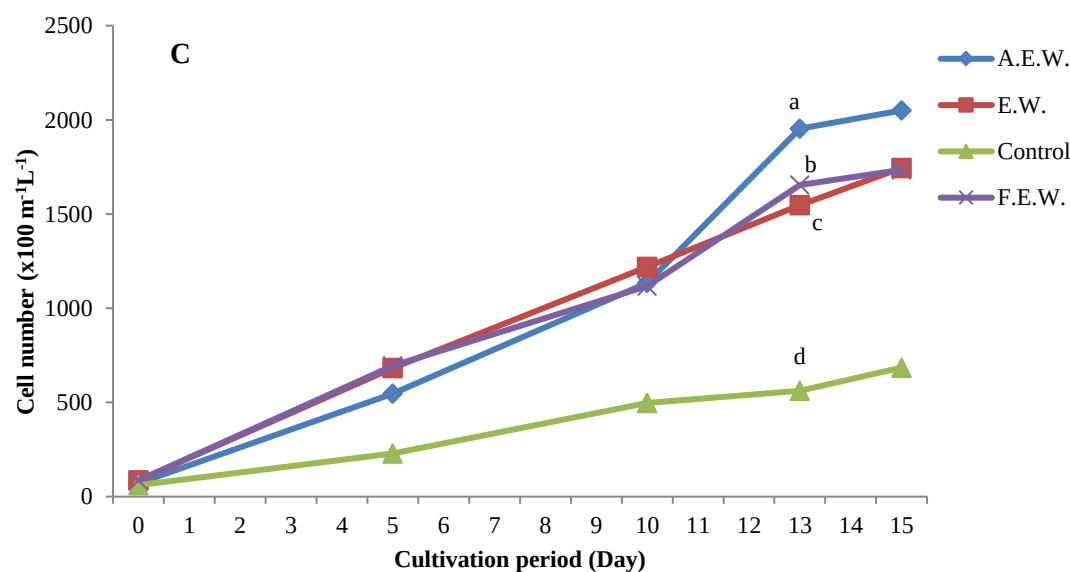
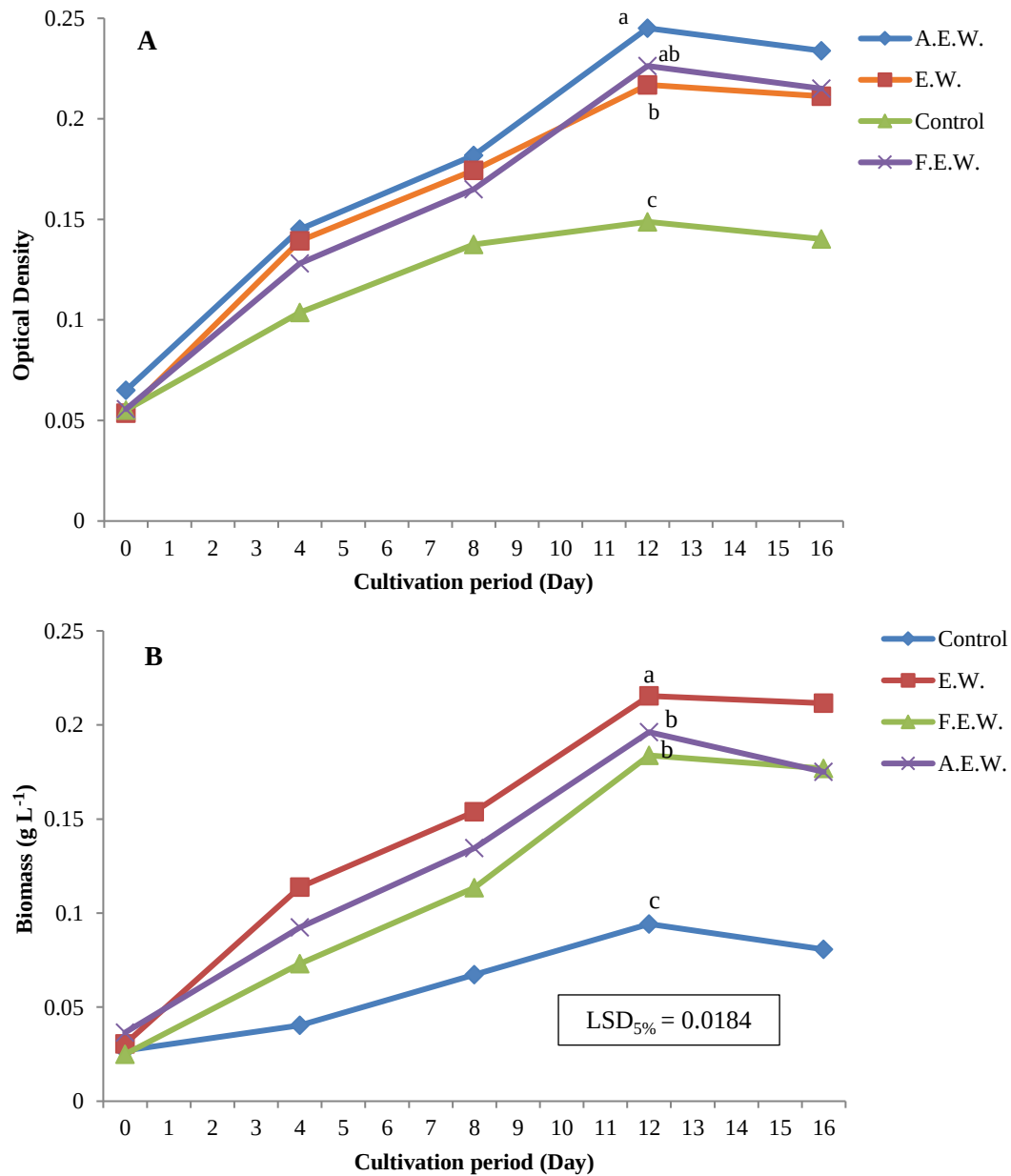


Fig. 1. Growth curve by monitoring (A) optical density at 680 nm, (B) biomass (g L^{-1}), and (C) cell number of *A. platensis* grown for 15 days on Zarrouk medium with distilled water (Control), Zarrouk medium with energetic water (EW), Zarrouk medium with filtered energetic water (FEW), and Zarrouk medium with autoclaved energetic water (AEW). Different lowercase letters inside the graphs show the significance of the difference on day 13th of culture among the treatments and control, as also shown in the attached ANOVA table for biomass production ($P < 0.05$)



Source of variation (day 12 th)	df	SS	MS	F
Treatments (water)	3	0.0431	0.0143	87.6305
Error	16	0.0026	0.00016	P < 0.0001
Total	19	0.0457	-	LSD _{5%} = 0.0184

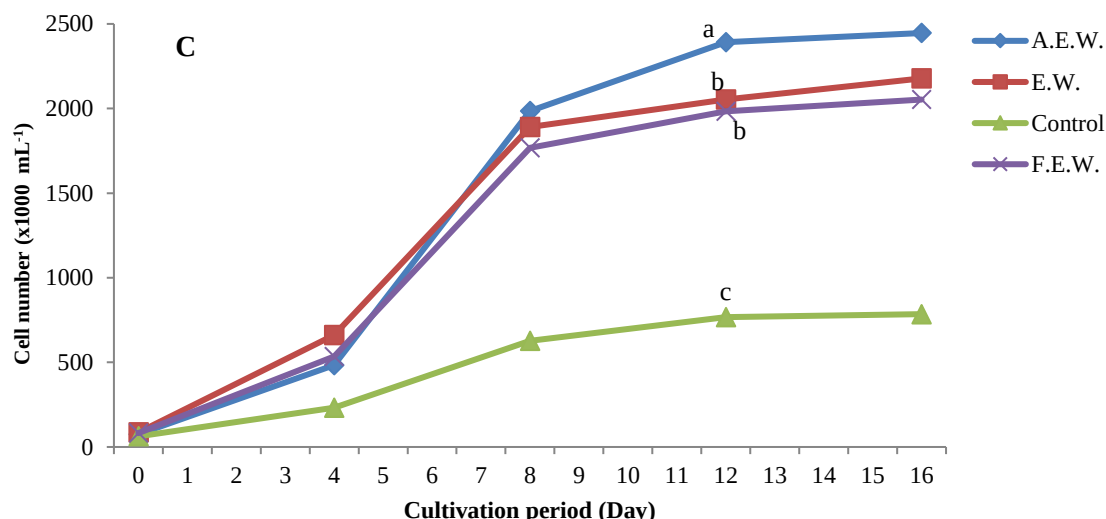


Fig. 2. Growth curve by monitoring the (A) optical density (680 nm), (B) biomass (g L^{-1}), and (C) cell number of *C. vulgaris* grown for 16 days on BG11 medium with distilled water (Control), BG11 medium with energetic water (EW), BG11 medium with filtered energetic water (FEW), and BG11 medium with autoclaved energetic water (AEW). Different lowercase letters inside the graphs show the significance of the difference on day 12th of culture among the treatments and control, as also shown in the attached ANOVA table for biomass production ($P < 0.05$)

In *A. platensis* microalgae, the highest OD (0.41) and cell number ($>19 \times 10^4$ cell mL^{-1}) at the peak and stationary growth phase (13th day) were observed in AEW treatment ($P < 0.05$), whereas the highest biomass yield (0.48 g L^{-1}) was obtained in EW ($P < 0.05$) (Fig. 1). As expected, Figure 2 depicted similar results for *C. vulgaris* microalgae and the highest OD (0.24 - 12th day), cell number ($>23 \times 10^5$ cell mL^{-1}) and biomass yield (0.22 g L^{-1}) were observed in AEW and EW treatments, respectively ($P < 0.05$).

According to Figures 1 and 2, related to the highest biomass production, which is the most important feature for responding to the treatments, EW revealed the best response; hence, this intact EW was employed (neither AEW nor FEW) to test its remarkable positive effects on the specific growth rate, biomass productivity, and doubling time of *A. platensis* and *C. vulgaris* microalgae, separately, compared with the control in a new experiment (Table 1).

Table 1- The specific growth rate (d^{-1}), biomass productivity ($\text{g L}^{-1} \text{d}^{-1}$), and doubling time (h) at the peak and stationary growth phase of *A. platensis* and *C. vulgaris* microalgae grown in the control and EW treatments. Different lowercase letters inside the table show the significance of the difference (t-Student test) between EW and the control for each microalga, independently ($P < 0.05$)

Microalgae Treatments		Specific growth rate (d^{-1})	Biomass productivity ($\text{g L}^{-1} \text{d}^{-1}$)	Doubling time (h)
<i>A. platensis</i>	Control	0.076 ± 0.0055^b	0.021 ± 0.0025^b	218 ± 9.504^a
	EW	0.134 ± 0.0065^a	0.062 ± 0.0056^a	124 ± 5.507^b
<i>C. vulgaris</i>	Control	0.106 ± 0.0093^b	0.010 ± 0.0020^b	156 ± 3.646^a
	EW	0.174 ± 0.0104^a	0.037 ± 0.0051^a	95 ± 4.604^b

Specific growth rate, biomass productivity, and doubling time at the peak and stationary

growth phase of *A. platensis* grown in EW (as the best treated water to produce more biomass)

were 0.134 d^{-1} , $0.062 \text{ g L}^{-1} \text{ d}^{-1}$, and 124 h, respectively, which were $\times 1.8$, $\times 2.9$, and $\times 0.57$ in comparison with the control, respectively ($P < 0.05$). The results obtained in *C. vulgaris* were more or less similar to *A. platensis*.

The content of biochemical components

Figure 3 depicts biochemical components, including lipids, proteins, phycobiliproteins, chlorophyll, and carotenoids in control and EW treatments at the peak and stationary growth phase of *A. platensis* and *C. vulgaris* microalgae. The quantum accelerator influenced the percentage of biochemical

components in microalgae. Significant differences in lipid, protein, and phycobiliprotein content were observed in the two treatments ($P < 0.05$). As shown in Figure 3, lipid content in control samples of *A. platensis* and *C. vulgaris* (%16 and %24, respectively) was higher than EW (12% and 19%, respectively), whereas, for protein and phycobiliprotein, the results were the opposite ($P < 0.05$). It also needs to be mentioned that chlorophyll and carotenoid content in EW treatment was slightly higher than control, though their discrepancies were not statistically significant.

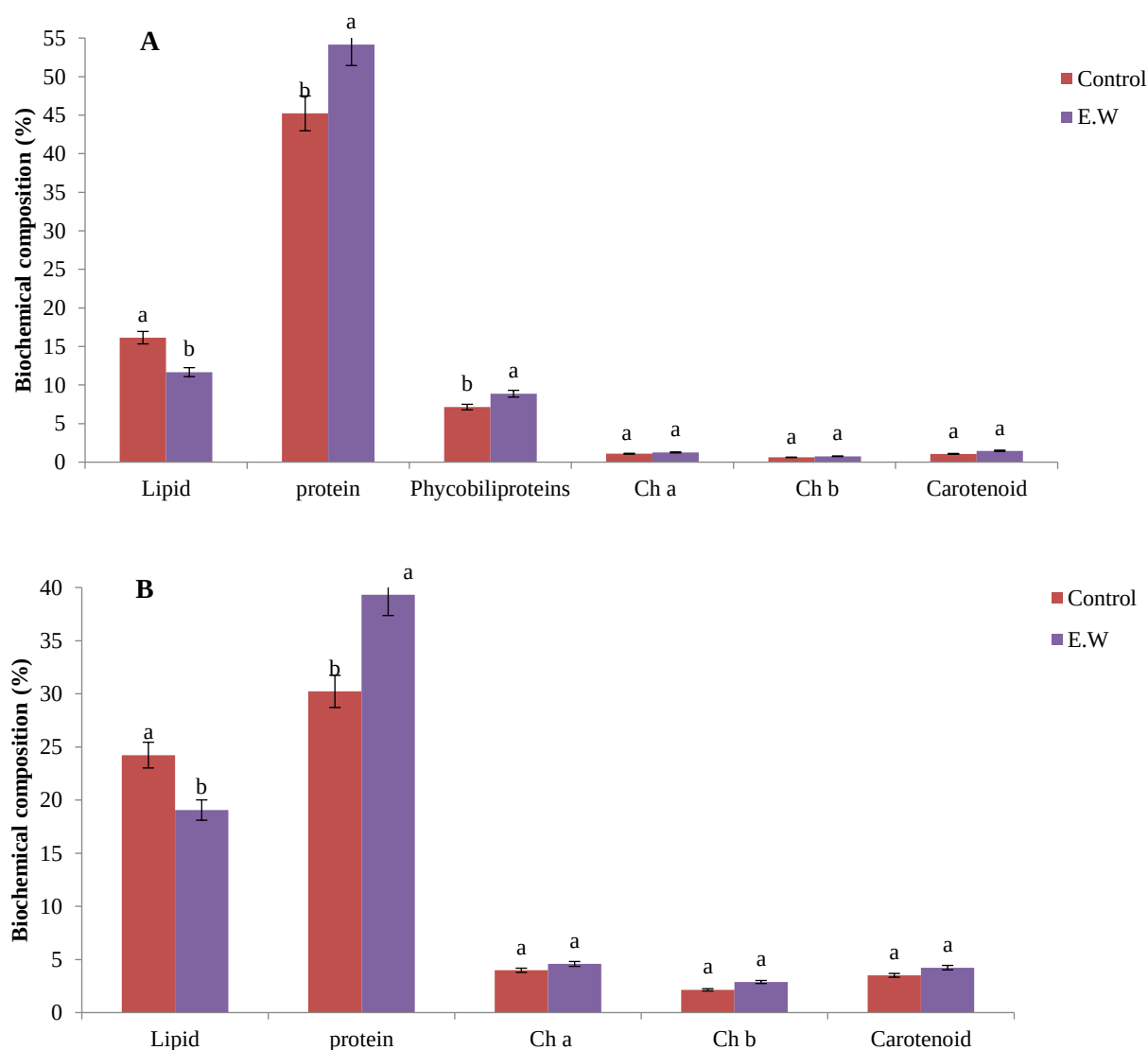


Fig. 3. The amount of lipids, proteins, phycobiliprotein, chlorophyll a, chlorophyll b, and carotenoid in (A) *A. platensis* (day 13th), and (B) *C. vulgaris* (day 12th) grown on Zarrouk and BG11 media

with distilled water (Control), and Zarrouk and BG11 media with energetic water (EW) at the peak stage. Different lowercase letters inside the graphs show the significance of the difference (t-Student test) between EW and the control based on three replications for each biochemical component ($P < 0.05$)

Calculations of Pearson's correlation coefficients between biomass yield and biochemical components (lipids, proteins, phycobiliproteins, chlorophyll, and carotenoids) also revealed a range of significant correlations among these yield components using EW treatment in *Chlorella* microalgae. Correlation analyses performed over the growth cycle of *C. vulgaris* (Table 2) revealed a significant negative relationship between lipid accumulation and biomass growth ($r = -0.991^{**}$), corroborating earlier findings reported by [Liang, Sarkany, and Cui \(2009\)](#). This inverse trend suggests that microalgal

growth rates decline when environmental conditions promote lipid biosynthesis ([Cobos et al., 2017](#)). Similarly, [Selvarajan et al. \(2015\)](#) observed that peak biomass production did not coincide with maximum lipid accumulation. This antagonistic association is likely attributable to the high metabolic costs inherent in lipid biosynthesis. However, conflicting evidence exists in the literature, with some studies reporting a positive correlation between lipid content and growth rate ([Hempel, Petrick, & Behrendt, 2012](#); [Li, Cui, Liu, Ding, & Liu, 2015](#)).

Table 2- The correlation coefficients (Pearson's) between biomass yield (g L^{-1}) and biochemical components (%) in *Chlorella vulgaris* grown under the EW treatment

Parameter	No.	1	2	3	4	5	6
Biomass yield	1	1.000					
Lipid	2	-0.991**	1.000				
Protein	3	0.986*	-0.998**	1.000			
Phycobiliproteins	4	0.863ns	-0.877ns	0.898ns	1.000		
Chlorophyll	5	-0.712ns	0.724ns	-0.75ns	-0.966*	1.000	
Carotenoid	6	-0.682ns	0.713ns	-0.74ns	-0.957*	0.990**	1.000

* ($P < 0.05$), ** ($P < 0.01$), ns: non-significant

Also, in this study, a positive and significant correlation was observed between protein content and biomass yield ($r = 0.98^*$). [Raven \(2013\)](#) and [Giordano, Palmucci, and Raven \(2015\)](#) separately stated that the association is due to the effect of growth and RNA content on protein biosynthesis. The interesting point of the findings was that, while most quality and quantity parameters of products are negatively correlated, here, EW was able to improve both parameters simultaneously, which is consistent with achievements for applying QHA in medical science and therapy for Rheumatoid Arthritis ([Mohaddes et al., 2025](#)). Moreover, there was a remarkable negative relationship between protein and lipid content ($r = -0.99^{**}$).

Although chlorophyll directly helps absorb and transform sunlight into biomass energy, while carotenoids serve a photo-protection function ([Rinawati, Sari, & Pursetyo, 2020](#)). However, the correlation between biomass and pigment content was not significant.

Study on the effects of EW on microalgae cells using electron microscope-TEM

Chlorella and *Spirulina* microalgae are a valuable source of food and oxygen in nature due to their high ability in photosynthesis. The general content and structure of the cells in a green microalga like *Chlorella* consist of a nucleus, vacuole, lipid bodies, mitochondria, and a large-scale chloroplast ([Bernaerts,](#)

Gheysen, Foubert, Hendrickx, & Van Loey, 2019). Thylakoids within chloroplasts with a three-dimensional crescent shape, are usually located at the outer edges of the microalgae cells. Thylakoids provide an extended contact surface with the light source for the various pigments located in this organelle. The presence of starch, lipids, and vacuoles can also be generally observed with a brighter colour in

electron microscope (TEM) images (Zhang, 2020).

Morphological changes in the cell volume can influence the efficiency of photosynthesis in these organisms through increased exposure to light. Figure 4 shows a comparison of average cell size (diameter, A) and cell volume (considered almost as a sphere, B) between control and EW-treated cells.

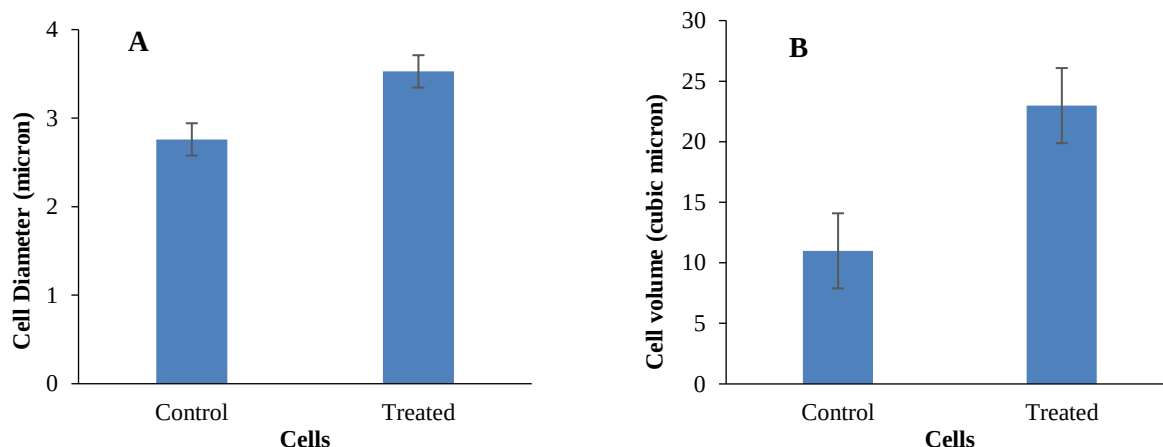


Fig. 4. Average (A) diameter and (B) volume of Chlorella cells in the control and EW-treated treatments

According to the mean diameters and volumes (approximately a sphere, $v = 4/3\pi r^3$) measured in many TEM common-scaled pictures of control and EW-treated cells (6 and 8 replications for Chlorella and Spirulina, respectively), a t-test showed a significant difference ($P < 0.01$) between their volumes (about 2.1-fold) as well as their diameters (about 1.3-fold). Based on Figures 5 and 6, the cell volume in the EW-treated cells of both microalgae species was noticeably larger than in their respective controls. Based on measurements of cell diameters and their average in treated cells in comparison with the control, a notable increase in volume was calculated (~210%) in the treated cells.

Figure 6 also shows the same effect of EW on Spirulina cells. Although we cannot calculate their volume, as was done for Chlorella in the previous figure (Fig. 5), the larger size of the treated cells is clear in the

common-scaled pictures.

An increase in cell volume provides suitable conditions for the absorption of materials by the cell and faster cell proliferation, which is consistent with the results of the growth rate in this research. On the other hand, according to the cell's behaviour during centrifugation, the samples treated with EW were lighter than the control cells, and their pellet density was obviously lower than the control. This issue could be explained by the change in volume and density of cells in EW treatment.

The threefold biomass production in microalgae treated with energetic water, which was reported in this research, is supposed to correspond to the change in cell volume. Therefore, it seems that the volume change was not only associated with more water absorption but also correlated with more dry matter production in the cells.

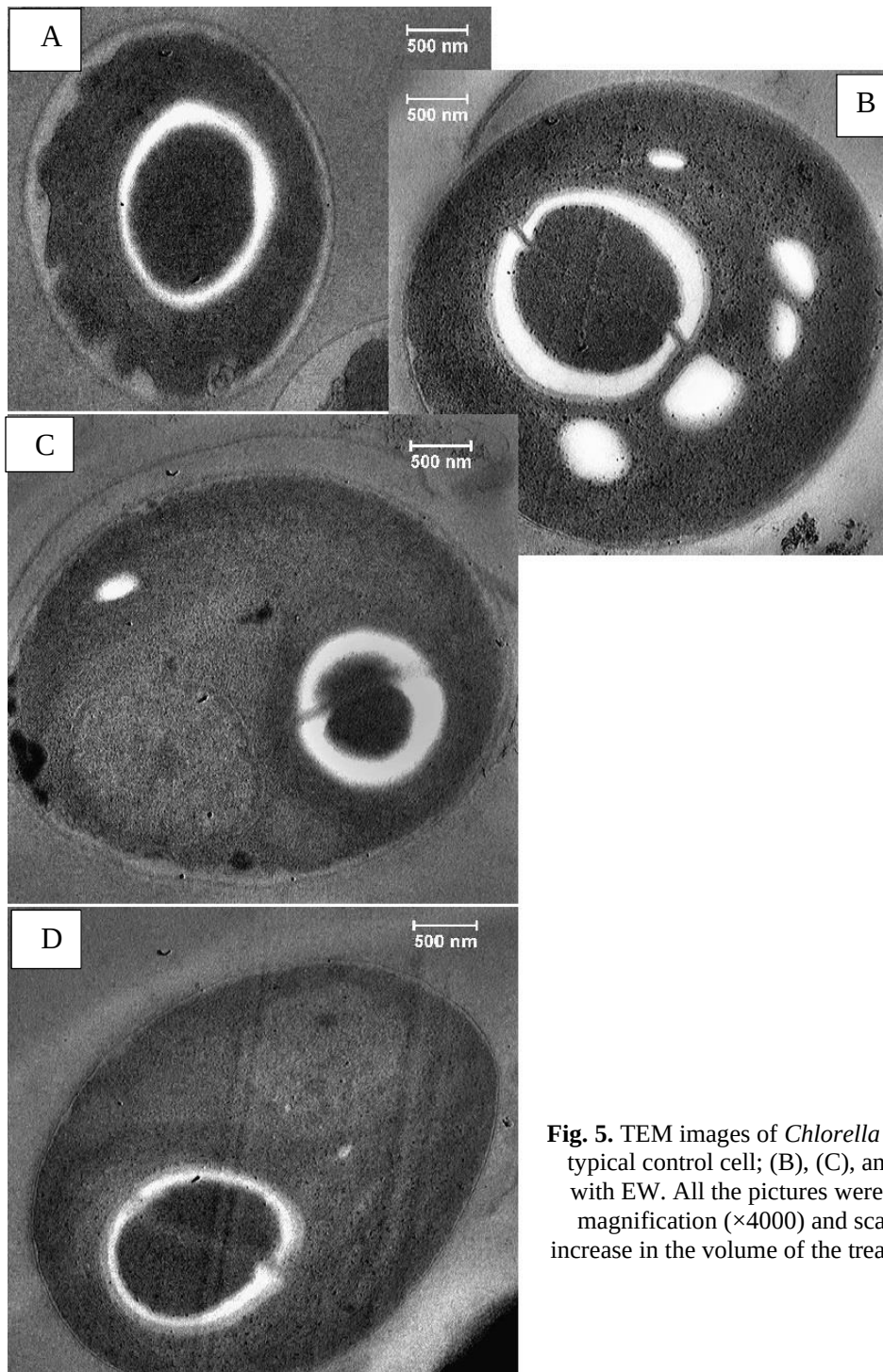


Fig. 5. TEM images of *Chlorella vulgaris* cells: (A) a typical control cell; (B), (C), and (D) cells treated with EW. All the pictures were taken at the same magnification ($\times 4000$) and scale bars. A visible increase in the volume of the treated cells is revealed

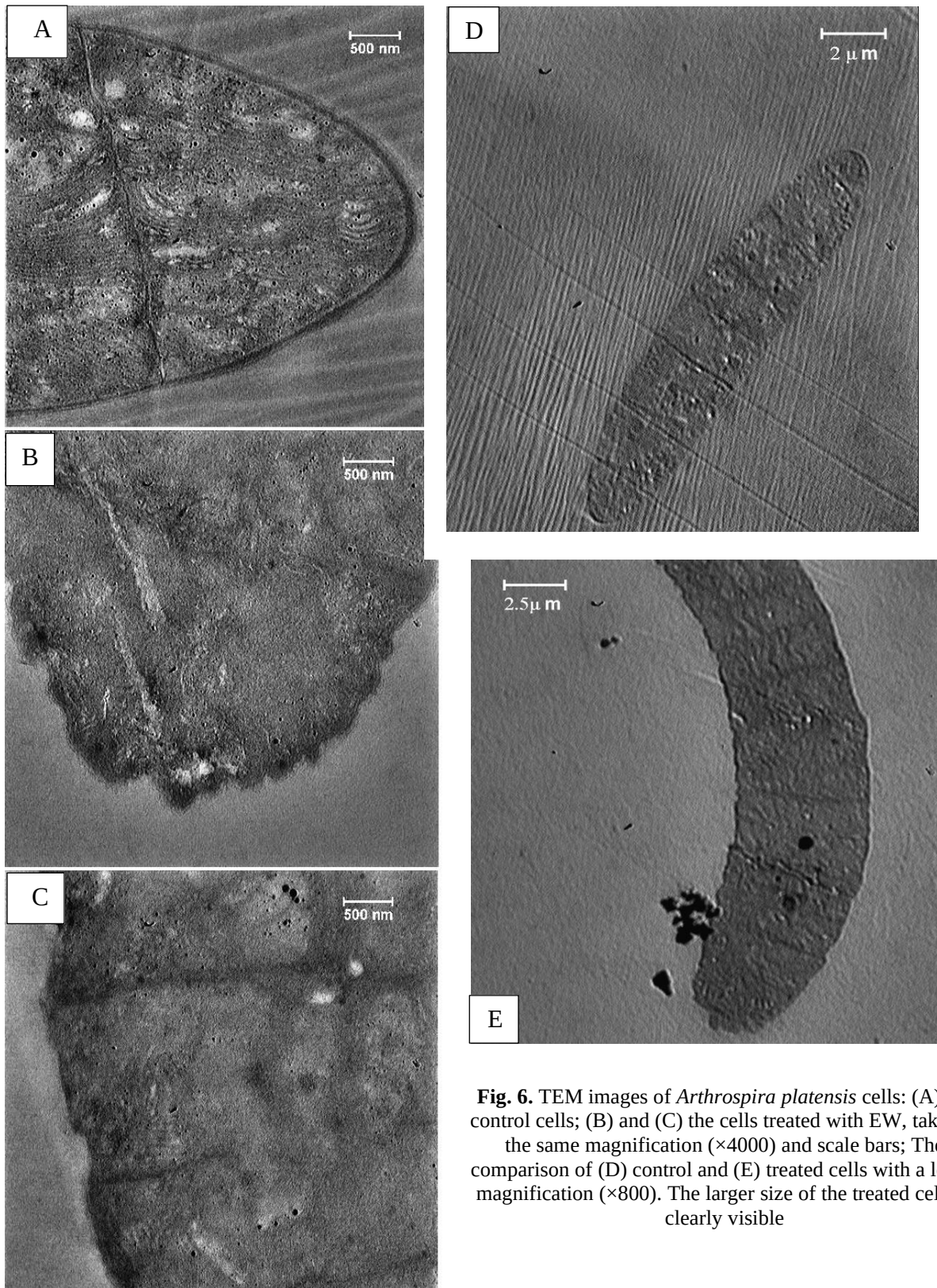


Fig. 6. TEM images of *Arthrospira platensis* cells: (A) the control cells; (B) and (C) the cells treated with EW, taken at the same magnification ($\times 4000$) and scale bars; The comparison of (D) control and (E) treated cells with a lower magnification ($\times 800$). The larger size of the treated cells is clearly visible

Discussion

The present study demonstrated that water treated using the quantum accelerator system was associated with significant improvements in the growth performance and biochemical composition of *Arthrospira platensis* and *Chlorella vulgaris*. The treated cultures showed higher biomass accumulation, increased specific growth rates, morphological changes, and enhanced concentrations of proteins and pigments compared with untreated controls.

These observations indicate that specific properties of the treated water may contribute to improved cultivation performance. Although the mechanism responsible for these responses remains to be clarified, the consistency of the observed improvements suggests that the treated water may represent a promising tool for microalgae culture, biotechnology, and sustainable biomass production. Further mechanistic investigations and independent validation studies are required before definitive conclusions regarding the origin of these effects can be established.

According to the results of the treated water as a black box, it seems that the collected bio-quantum resonance, encoded within the water through Fibonacci-informed carbon structures and environmental field entrainment, as the manufacturing company claims, could probably communicate directly the internal architecture of life. Not through chemistry alone, but through pattern, vibration, and informational symmetry. The mechanism responsible for these observations is still unknown and should be clarified using more tests. When this cosmic rhythm is embedded into the cell, even for a microorganism, the outcome is probably more than a biological effect, and water is no longer seen as a passive medium, but participatory (Ho, 2015; Smith, 2004).

From a commercial point of view, the purpose of the present work was to investigate only the biological effects of the treated water and assess its potential applications under controlled experimental conditions rather than to establish an industrial production model. As with many emerging technologies, early-stage laboratory systems are primarily designed for

scientific evaluation and validation and are not necessarily intended to represent the final commercial configuration. Future development of larger treatment units, together with improvements in system design and production efficiency, may substantially increase processing capacity and reduce operating costs per unit volume. Such modifications could improve the economic viability of the technology and support its transition from laboratory-scale research to broader commercial applications. Nevertheless, further engineering studies and dedicated techno-economic assessments will be required to determine the optimal production scale and to evaluate the overall cost-effectiveness of the process under industrial conditions.

Conclusions

The findings of the present study demonstrate that the water treated by the Quantum Health Accelerator® system was associated with substantial improvements in the cultivation performance of both *Arthrospira platensis* and *Chlorella vulgaris* under the experimental conditions employed. Compared with the control cultures, treated microalgae exhibited markedly higher biomass accumulation, enhanced specific growth rates, larger cell size, and increased concentrations of proteins and photosynthetic pigments. In several measured parameters, the observed responses approached a two- to three-fold improvement ($P < 0.05$) relative to the untreated controls. Preliminary results on the water as a Quantum Health Accelerator® (the same authors, Mohaddes *et al.*, 2025) had shown that the water can potentially absorb and retain the vital bio-quantum frequencies from nature. These frequencies are specifically transmitted through water and work as an accelerator to improve the growth, life, and health of any living organs or organisms, although energy residues may be removed from this energetic water (EW) after a while. It should not be forgotten that the water has no added minerals or chemical components, which might be considered the cause of this valuable increase in the quantity and quality of the

products. Furthermore, while the improvement in quality and quantity parameters of products is negatively correlated in most cases in agriculture, here, the EW treatment was able to simultaneously improve both parameters. These results were consistent with some new achievements for applying QHA in medical science and therapy on Rheumatoid Arthritis (Mohaddes et al., 2025).

Microbiological and physicochemical analyses confirmed that the treated water complied with acceptable quality standards and did not contain detectable contamination or externally added nutrients capable of directly explaining the magnitude of the observed biological effects.

Overall, the findings provide experimental evidence that the treated water was associated with enhanced biological performance in two commercially important microalgae species and justify continued scientific investigation into the physicochemical factors underlying these responses.

Acknowledgments

The authors are grateful to the Ferdowsi University of Mashhad for the technical support and cooperation in this project, recorded as project No. 40413. Also, this endeavour would not have been possible without Dr. Sara Khosravinia, who helped us obtain the pure algae to fulfil this project.

Statements and Declarations

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There are no conflicts of interest. For biological evaluations, the corresponding author (S. Malekzadeh-Shafaroudi) received a grant from Ferdowsi University of Mashhad, supported by the American Quantum Food Supplements Trading L.L.C., UAE (grant number: 40413), but was completely blinded regarding the process applied on the received water; therefore, there are no known/unknown conflicts of interest for the assessments. It should be mentioned that Ali Akbar Mohaddes, Mohammad Ali Saatchi, Marziye Afshari-Chamanabadi, Saeed Saatchi, Elnaz Masoudi, and Amir Mansouri Daneshvar, who made the water (patented), are members of the American Quantum Food Supplements Trading L.L.C. (License No. 1090645, UAE).

Author Contributions

Malekzadeh-Shafaroudi S. obtained the grant for this research, conducted the study design, coordinated research activities and participated in the preparation and edit of the manuscript. Mohaddes A.A. participated in preparing and testing the water (EW) and effectively helped to draft and edit the manuscript. Saatchi M.A. and Saatchi S. performed the water analysis and helped in the preparation of the manuscript. Afshari-Chamanabadi M. participated in biometrical analysis and helped to draft the manuscript. Masoudi E. and Mansouri-Daneshvar A. helped in the preparing and testing the water (EW) and helped to draft the manuscript.

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شتاب‌دهنده سلامت کوانتومی®: انتخابی نوین برای رشد بسیار سریع ریزجلبک‌ها؛ آرتروسپیرا پلاتنسیس و کلرلا ولگاریس

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تاریخ دریافت: ۱۴۰۵/۰۲/۱۵

تاریخ پذیرش: ۱۴۰۵/۰۶/۰۹

چکیده

جلبک‌ها و ریزجلبک‌ها منبع برجسته اکسیژن و غذا برای دنیای زنده هستند. هر عاملی که بتواند سرعت رشد و تولید این موجودات ارزشمند را بهبود بخشد، می‌تواند راه بالقوه‌ای برای دستیابی به پایداری برای زندگی انسان باشد. ریزجلبک‌هایی مانند کلرلا و آرتروسپیرا (اسپیرولینا) به‌عنوان موجوداتی کارآمد در جمع‌آوری انرژی نور خورشید و تبدیل آن به زیست‌توده یا ترکیبات بیوشیمیایی عمل می‌کنند. در این تحقیق، سعی شده است اثرات آب غنی‌شده (Quantum Health Accelerator®- QHA) با اطلاعات/انرژی حیاتی زیستی-کوانتومی که در این‌جا به اختصار آب پرنرژی (EW) نامیده می‌شود بر تولید زیست‌توده، ترکیب/محتوای بیوشیمیایی و همچنین ویژگی‌های مورفولوژیکی این دو ریزجلبک مهم از نظر کشاورزی ارزیابی شود. شتاب‌دهنده (EW) آزمایش‌شده در محیط‌های کشت BG11 و Zarrouk برای ریزجلبک‌های مذکور در نسخه‌های مختلف، که به‌ترتیب با آب پر انرژی (EW)، آب مقطر معمولی (به‌عنوان شاهد یا کنترل)، آب پرنرژی فیلترشده (FEW) و آب پرنرژی اتوکلاو شده (AEW) ساخته شده بودند، اعمال شد. تولید زیست‌توده، ترکیب/محتوای بیوشیمیایی و همچنین ویژگی‌های مورفولوژیکی این دو ریزجلبک به‌طور منظم ثبت شد. نتایج به‌طرز شگفت‌آوری تغییر مورفولوژیکی قابل‌توجهی را همراه با تغییر چشمگیر (عمدتاً دو یا سه برابر بیشتر از کنترل) در زیست‌توده، رنگدانه‌ها، پروتئین‌ها، حجم سلول و هم‌زمان نرخ رشد ویژه بالاتر ($P < 0.05$) پس از اعمال شتاب‌دهنده کوانتومی آشکار کرد و نشان داد که اثر واقعی این تیمار مؤثر است و می‌تواند از نظر اقتصادی در کشت جلبک مورد استفاده قرار گیرد.

واژه‌های کلیدی: آب غنی‌شده با بیوکوانتوم، ریزجلبک، زیست‌توده، سرعت رشد

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