Biochem. Cell. Arch. Vol. 22, No. 1, pp. 1145-1149, 2022	www.connectjournals.com/bca	*ISSN 0972-5075*
DocID: https://connectjournals.com/03896.2022.22.1145		*eISSN 0976-1772*

ESTIMATION OF SOME ACTIVE COMPOUNDS IN LOCAL ISOLATE OF *SPIRULINA LAXA* G.M. SMITH

Nuha A. Mohammed* and Harith K. Buniya

Department of Biology, College of Education for Pure science, University of Anbar, Iraq.
*e-mail : nuhaam@gmail.com

(Received 2 May 2021, Revised 28 July 2021, Accepted 4 August 2021)

ABSTRACT : This study includes isolation, purification and Identification of a local isolate of the Cyanobacteria *Spirulina laxa* G.M. Smith from sulfur water in Al-Anbar Governorate, west of Iraq. Using the dilution method, the studied sample was isolated and cultured in BG11medium and used antibiotics to obtained Axenic culture. The Biomass was Dried under 45 C° for 24 hrs. to get Dry powder. The results of analysis of some compounds in *S. laxa* G.M. Smith showed that the biomass contained (59.2%) protein, and (14.8%) carbohydrate and the amount of chlorophyll A was (410.6 mg / 100 mg). The total amount of phenols and flavonoids was (94.5 mg) and (56.9mg), respectively. The result revealed *S. laxa* G.M. Smith has a high amount of antioxidants.

Key words : Cyanophyta, *Spirulina*, protein, carbohydrate, antioxidants.

How to cite : Nuha A. Mohammed and Harith K. Buniya (2022) Estimation of some active compounds in local isolate of *Spirulina laxa* G.M. Smith. *Biochem. Cell. Arch.* **22**, 1145-1149. DocID: https://connectjournals.com/03896.2022.22.1145

INTRODUCTION

Blue-green algae (Cyanobacteria) are prokaryotes that can photosynthesize and produce oxygen due to their chlorophyll A content (Willey *et al*, 2011). One of the essential uses of blue-green algae on a nutritional scale is its use as a cellular protein, many peoples use it as an essential food such as *Spirulina* and it is still used in many countries as well where great attention has been given to *spirulina* as a nutritional supplement, due to its helpful composition consisting of proteins (50-70% of dry weight), unsaturated fatty acids, polysaccharides, vitamins, minerals such as selenium, calcium, chromium, iron, manganese, zinc, magnesium, phenols, flavonoids, chlorophyll, carotenoids and vegetable proteins (Gabr *et al*, 2020).

Spirulina is a microscopic, filamentous, multicellular algae characterized by a spiral, irregularly shaped and non-branched filament structure. The filaments are narrow helical single or intertwined with each other, the cell intersects with walls, and the length is greater than the width. Nowadays, interest in *Spirulina* is constantly increasing in various fields such as agriculture, food, cosmetics, medicine, pharmacy and technology (Wali and Abdljbaar, 2020).

The World Health Organization (WHO) has classified spirulina as a 'premium food' and is also used in space food for astronauts due to its high nutritional value (Shao *et al*, 2019).

This research aims to isolate and purify *Spirulina* from the local environment, and culture to obtain biomass, then quantify some essential compounds in local isolation.

MATERIALS AND METHODS

Collection of samples

Blue-green algae isolates were collected from Anbar Governorate, Heet District, Kubaisah District, Western Iraq from sulfur springs and brought to the laboratories of the Biology Department in the College of Education for Pure Sciences, Anbar University, where they were washed with distilled water for several times to remove any contaminated materials.

Isolation and diagnosis of *Spirulina*

The dilution method, according to Stein (1973) was used to isolate *Spirulina* on the sterile liquid culture medium BG11(HIMEDIA, INDIA), which was prepared according to the manufacture's provider. And diagnosed based on Smith (1916).

Purification of isolates

Followed the method of Stein (1973) to purify the isolates and used antibiotics to obtain Axenic culture,

(Berteotti *et al*, 2016).

Araújo *et al* (2021), also, with time, the amount of protein in blue-green algae increases due to their ability to produce it. Furthermore, because the study sample was collected from a mineral water spring rich in ions of the significant nutrients necessary for cell growth and the formation of the chlorophyll molecule, and the most important of these ions is the magnesium ion, whose presence is necessary for the formation of the chlorophyll molecule (Borah *et al*, 2021).

This may be attributed to the reason for the increase in the percentage of chlorophyll in the studied sample, the fact that the magnesium ion is included in the composition of transport enzymes and the process of photophosphorylation of algae (Wetzel, 2001).

Spirulina is known to provide the pure form of chlorophyll with low costs as most of the chlorophyll present in spirulina (about 90%) takes the form of chlorophyll A (Choi and Lee, 2018).

The demand for chlorophyll has increased recently because its biological activity is considered to be similar to that of antioxidants, and chlorophyll A is the most active among the other types of chlorophyll, such as chlorophyll B or C (Choi and Lee, 2018). In our current study, the percentage of antioxidants in *Spirulina* was estimated because, at present, it is considered one of the main areas of great interest for research in food science and technology is the so-called functional foods because they can provide nutritional, physiological and biological benefits such as antioxidants (Plaza *et al*, 2008).

Recently, much attention has been focused on microalgae as sources of new bioactive compounds such as phycobilins, phenols, terpenoids, and steroids (Abd El-Baky *et al*, 2008). Phenolic algal compounds have been reported as a potential candidate for fighting free radicals, which harm our bodies (Estrada *et al*, 2001). Also, in vitro studies have shown that *Spirulina* species have many therapeutic properties due to their ability. On cleaning of superoxide and hydroxyl radicals (Li *et al*, 2007).

The potential health benefits of bioactive algae compounds such as phenols are extensively investigated. In humans, they are potent antioxidants, which may prevent oxidative damage to vital molecules such as DNA, fats and proteins that play a role in chronic diseases such as cancer (Dröge, 2002).

It can also be seen that the algal phenolic extracts can protect against CCl_4-induced lipid peroxidation in vivo. Therefore, it can be suggested that algae extracts may perform a better function in removing free radicals and inhibiting cytochrome P450 reactions responsible for the metabolism of foreign biotic substances and thus may affect their toxicity and ability to cause cancer. Therefore, algal phenolic compounds may be a promising alternative to synthetic materials as a natural compound with antagonistic activity. Therefore, *Spirulina* may be used as a powerful natural source of nutritional and functional ingredients (El-Baky *et al*, 2009).

REFERENCES

Abd El-Baky H H, El Baz F K and El-Baroty G (2008) Evaluation of marine alga *Ulva lactuca* L. as a source of natural preservative ingredient. *Am. Eurasian J. Agric. Environ. Sci*. **3**, 434-444.

Araújo R *et al* (2021) Current status of the algae production industry in Europe: an emerging sector of the Blue Bioeconomy. *Front. Mar. Sci.* **7**, 1247.

Baba S A and Malik S A (2015) Determination of total phenolic and flavonoid content, antimicrobial and antioxidant activity of a root extract of *Arisaema jacquemontii* Blume. *J. Taibah Univ. Sci.* **9**, 449-454.

Borah D, Gopalakrishnan S and Nooruddin T (2021) Carbohydrate Biolubricants from Algae and Cyanobacteria. *J. Poly. Environ.* 1-15.

Cameron J C and Pakrasi H B (2011) Glutathione facilitates antibiotic resistance and photosystem I stability during exposure to gentamicin in cyanobacteria. *Appl. Environ. Microbiol.* **77**, 3547.

Choi W Y and Lee H Y (2018) Enhancement of chlorophyll a production from marine *Spirulina maxima* by an optimized ultrasonic extraction process. *Appl. Sci.* **8**, 26.

Dröge W (2002) Free radicals in the physiological control of cell function. *Physiological Rev.* **82**, 47-95.

El-Baky H, El Baz F K and El-Baroty G S (2009) Production of phenolic compounds from *Spirulina maxima* microalgae and its protective effects. *Afr. J. Biotech.* **8**.

Gabr G A, El-Sayed S M and Hikal M S (2020) Antioxidant activities of phycocyanin: A bioactive compound from *Spirulina platensis*. *J. Pharmaceut. Res. Int.* 73-85.

Khan Z, Bhadouria P and Bisen P (2005) Nutritional and therapeutic potential of Spirulina. *Curr. Pharmaceut. Biotech.* **6**, 373-379.

Laouini S E and Ouahrani M R (2017) Phytochemical screening, *In vitro* antioxidant and antibacterial activity of *Rumex vesicarius* L. extract. *Scientific Study & Research. Chemistry & Chemical Engineering, Biotechnology, Food Industry* **18**, 367-376.

Li H-B, Cheng K-W, Wong C-C, Fan K-W, Chen F and Jiang Y (2007) Evaluation of antioxidant capacity and total phenolic content of different fractions of selected microalgae. *Food Chem.* **102**, 771-776.

Mehariya S, Goswami R K, Karthikeysan O P and Verma P (2021) Microalgae for high-value products: A way towards green nutraceutical and pharmaceutical compounds. *Chemosphere* **280**, 130553.

Michael A, Kyewalyanga M S and Lugomela C V (2019) Biomass and nutritive value of Spirulina (*Arthrospira fusiformis*) cultivated in a cost-effective medium. *Annals Microbiol.* **69**, 1387-1395.

Parimi N S, Singh M, Kastner J R and Das K C (2015) Biomethane and biocrude oil production from protein extracted residual *Spirulina platensis*. *Energy* **93**, 697-704.

Plaza M, Cifuentes A and Ibáñez E (2008) In the search of new functional food ingredients from algae. *Trends Food Sci. Tech.* **19**, 31-39.

Porra R J and Scheer H (2019) Towards a more accurate future for chlorophyll a and b determinations: the inaccuracies of Daniel Arnon's assay. *Photosynthesis Res.* **140**, 215-219.

Schaeffer D J and Krylov V S (2000) Anti-HIV activity of extracts and compounds from algae and cyanobacteria. *Ecotoxicol. Environ. Saf.* **45**, 208-227.

Shao W, Ebaid R, El-Sheekh M, Abomohra A and Eladel H (2019) Pharmaceutical applications and consequent environmental impacts of Spirulina (Arthrospira): An overview. *Grasas y Aceites* **70**, 292.

Smith G M (1916) New or interesting algae from the lakes of Wisconsin. *Bull. Torrey Botanical Club* **43**, 471-483.

Van Dijk D and Houba V (2000) Homogeneity and stability of materials distributed within the Wageningen evaluating programmes for analytical laboratories. *Communications in Soil Science and Plant Analysis* **31**, 1745-1756.

Wali N M and Abdljbaar A S (2020) Effect of ethanol and alkaloid extract of *Spirulina platensis* against dermatophyte fungi. *Plant Archives* **20**, 2736-2743.

Wetzel R G (2001) *Limnology: lake and river ecosystems*: gulf professional publishing.

Whistler R L and Whistler R L (1962) *Methods in carbohydrate chemistry*.

Willey J, Sherwood L and Woolverton C (2011) *Prescott's Microbiology*. Eight Edition. McGraw Hill Companies Inc., New York, USA.