

# CODEX ALIMENTARIUS COMMISSION



Food and Agriculture  
Organization of the  
United Nations



World Health  
Organization

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Agenda Item 7

CRD06

## JOINT FAO/WHO FOOD STANDARDS PROGRAMME EXECUTIVE COMMITTEE OF THE CODEX ALIMENTARIUS COMMISSION

Eighty-sixth Session

FAO Headquarters

Rome, Italy

1 – 5 July 2024

### PROPOSALS ON SPIRULINA

*Submitted by the Coordinator for Near East on behalf of Egypt*

#### BACKGROUND

1. New food sources imply those that have not been widely consumed, either because their consumption have been historically restricted to certain regions in the world or they have recently emerged in the global retail space thanks to technological innovations.
2. They are also considered new within the framework of existing Codex standards. New food production systems reflect novel innovations or advancements in preexisting food technologies that are involved in producing some of the new foods that are finding their way into the mainstream.
3. AS CAC46 noted the range of issues expressed by members and observers and encouraged members to submit discussion papers or new work proposals, either to active Codex committees or to the Executive Committee through the Codex Secretariat.

#### INTRODUCTION

4. Spirulina is a multicellular and filamentous cyanophyte blue green microalgae and consists of about 15 species. The two species which are most widely used are *Spirulina platensis* and *Spirulina maxima* belonging to the Microcoleaceae family. Spirulina grows in water, can be harvested, and processed easily and has significantly high macro- and micronutrient contents. Spirulina contains high amounts of excellent quality protein (55-70 %dry weight) which has balanced essential amino acid content, it is superior to all standard plant protein. This data was enough to launch many research projects for industrial purposes because it seemed to be the most direct route to inexpensive proteins. Spirulina also has a high amount of essential fatty acids, vitamins, minerals, and photosynthetic pigments such as chlorophyll and phycocyanin.
5. In many countries of Africa, it is used as human food as an important source of protein and is collected from natural water, dried and eaten. It has gained considerable popularity in the human health food industry and in many countries of Asia it is used as protein supplement and as human health food. Spirulina has been used as a complementary dietary ingredient of feed for fish, shrimp, and poultry, and increasingly as a protein and vitamin supplement to aquafeeds.
6. Spirulina extract is used for colouring foods such as flavoured dairy products, cheese, dairy desserts and ice cream, non-dairy ice cream (e.g. sherbet), processed fruits and vegetables, baked goods and baking mixes, alcoholic and non-alcoholic beverages and beverage bases, breakfast cereals, cocoa products, confectionary (including soft and hard candy, chewing gum), egg products, gravies and sauces, herbs and spices, condiments, and soups and soup mixes. Spirulina extract is also used as a colouring agent in food supplements (GSFA category 13.6) including nutritional supplements, vitamins and minerals.

7. Spirulina has a unique quality to detoxify (neutralize) or to chelate toxic minerals, it can be used to chelate or detoxify the poisonous effect of heavy metals from water, food and environment. Spirulina is grown under certain conditions using clean water and certain nutrients.

#### **ROCOMMENDATIONS**

8. The document is being submitted to inform the (CCEXEC) about Egypt's efforts to support the conclusion of the 46th Session of the Codex Alimentarius Commission (CAC46). This paper is for CCEXE86's noting and comments.

**PROJECT DOCUMENT**  
**PROPOSAL FOR NEW WORK ON CODEX STANDARD FOR SPIRULINA**

*Proposed by Egypt*

### **1. The Purpose and Scope of the Standard**

The scope of the work is to establish a worldwide standard for dried spirulina to be offered for industrial food production and direct consumption, including for catering purposes or for repacking, as required.

The objective is to develop a Codex standard based on measurable characteristics, specifically safety, quality criteria, and any other factors for developing an international document to protect consumer's health and facilitate international trade.

### **2. Relevance and Timeliness**

The global population is expected to reach 9.7 billion in 2050 with growth rates expected to vary across different regions. To meet the increasing demand for food, overall food production will need to be raised by about 70 percent above 2009 levels, by 2050.

Agriculture is increasingly putting pressure on our finite natural resources with nearly half of all cultivated land on the planet and 70 percent of freshwater worldwide used by agriculture. On the other hand, climate change is already affecting our ability to maintain food production by reducing crop yields and nutritional content of major cereals. Increasing awareness of these impacts is propelling efforts to find (or innovate) and bring to mainstream new food sources and food production systems that are more sustainable than those available conventionally.<sup>1</sup>

The global orientation in searching for new sources of protein, FAO initiative towards the use of new or alternatives sources of proteins.

The topic of new food sources and food production systems has garnered significant interest at the Codex level, with discussions at the Executive Committee of the Codex Alimentarius Commission (CCEXEC81)<sup>2</sup> and the Codex Alimentarius Commission (CAC44)<sup>3</sup>. Considering the cross-cutting nature of these issues, it was agreed to set up a sub-committee of CCEXEC to consider potential mechanisms that will begin to address this emerging topic.

Some of these new food sources are edible insects, jellyfish, plant-based alternatives, and seaweed (or macroalgae). Cell-based food production as a new food production system is also considered.

Spirulina grows naturally in the lakes of the warm regions in alkaline water lakes besides Lake Texcoco in Mexico, the largest spirulina lakes are in Central Africa around Lakes Chad and Niger, and in East Africa along the Great Rift Valley. It is also a major species in Kenya's and Ethiopia's lakes. Spirulina can be cultivated commercially from natural sources; it is produced in at least 22 countries. United States of America has a number of the largest intensive farms in the world, mainly based in Hawaii and California.

The Global Spirulina Powder Market Size was valued at USD 480.56 Million in 2022. The Market is growing at a CAGR of 9.57% from 2022 to 2032. The Worldwide Spirulina Powder Market is expected to reach USD 1198.95 Million by 2032. Asia Pacific is expected to grow the fastest during the forecast period.

The global orientation in searching for new sources of protein and WHO initiatives towards the use of alternatives sources of proteins from plant or animal cells, insects or fermentation.

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<sup>1</sup> <https://openknowledge.fao.org/server/api/core/bitstreams/0aa558d4-57c7-498d-87f7-b9e37577882f/content/src/html/new-food-sources-and-food-production-systems.html>

<sup>2</sup> [Report of the Eighty-First Session of the Executive Committee of the Codex Alimentarius Commission. Joint FAO/WHO Food Standards Programme, Codex Alimentarius Commission, Forty-fourth session](#)

<sup>3</sup> New food sources and production systems: Need for Codex attention and guidance?, Joint FAO/WHO Food Standards Programme, Codex Alimentarius Programme, Forty-fourth session.

Commercial production of spirulina takes two broad approaches. That of industrialized countries who are interested in producing the blue-green alga for the natural food and health food market, as well as for the extraction of high-value biochemicals. And that of developing countries which are in search of a rich source of protein, produced under local conditions and using marginal land and saline water not suitable for agriculture.

Spirulina not only reduces the carbon footprint, but also increases the chances of eliminating carbon emissions in supply chains, industry, agriculture, and are environmentally friendly.

Increasing consumer awareness of the health benefits of Spirulina, increasing demand for natural and organic products and growing popularity of vegan and vegetarian diets.

Unifying the product standards and specification by developing a worldwide standard will help to protect consumer's health and to facilitate fair trade.

### **3. Main aspects to be covered.**

The standard will cover characteristics related to identification and quality in all aspects as well as safety requirements:

- **Product definition:** Defining the product as dried spirulina including the common, trade and scientific names.
- **Style:** Listing the different forms of the dried spirulina.
- **Physical and chemical characteristics.**
- **Quality criteria:** Including provisions for colour , odour , ...etc.
- **Provisions for the labeling and marking** in accordance with the CODEX standard for the labeling of pre-packaged foods.
- **Provisions for hygiene, contaminants, and pesticides residues** with reference to pre-existing Codex documents.
- **References to Methods of Analysis and Sampling.**

### **4. Assessment against the criteria for the Establishment of Work Priorities**

#### **General Criterion**

- Protecting the consumer from a health standpoint.
- Promotion of consumer protection and the prevention of fraudulent practices
- Providing greater assurance of product quality to meet consumer needs and minimum food safety requirements.
- Reaching unified levels of standardization based on differences to meet industrial and consumer needs with high credibility and accuracy.
- In addition, the elaboration of the standard would be to the benefit of many countries in general and more particularly for producers, exporters, and importers of spirulina.

#### **Criteria applicable to commodities**

##### **(a) The Global Spirulina Market**

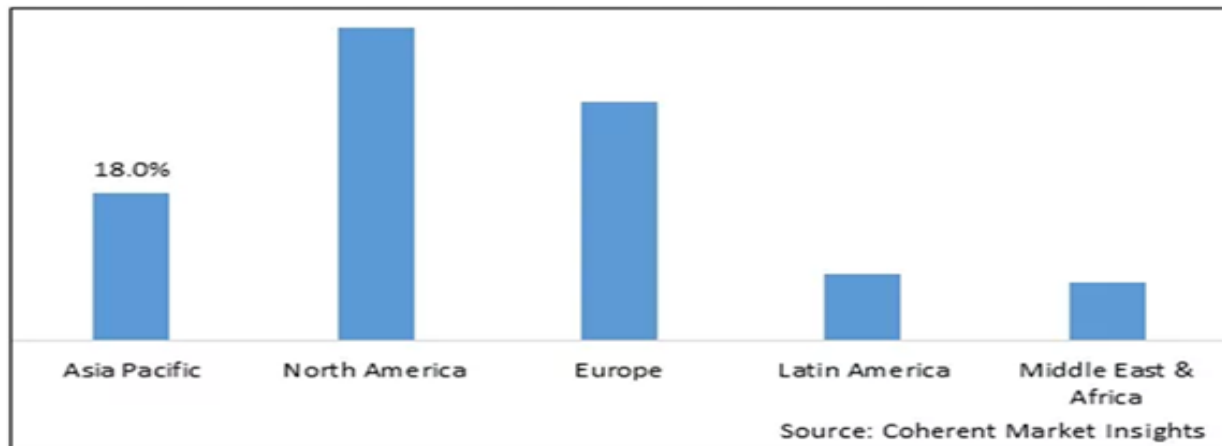
**Figure 1. Global Spirulina Powder Market Size (2022 to 2032).**



<https://www.sphericalinsights.com/reports/spirulina-powder-market>

The Global Spirulina Powder Market Size was valued at USD 480.56 Million in 2022. The Market is growing at a CAGR of 9.57% from 2022 to 2032. The Worldwide Spirulina Powder Market is expected to reach USD 1198.95 Million by 2032.

**Figure 2. Spirulina Market Share (%), By Region, 2024**



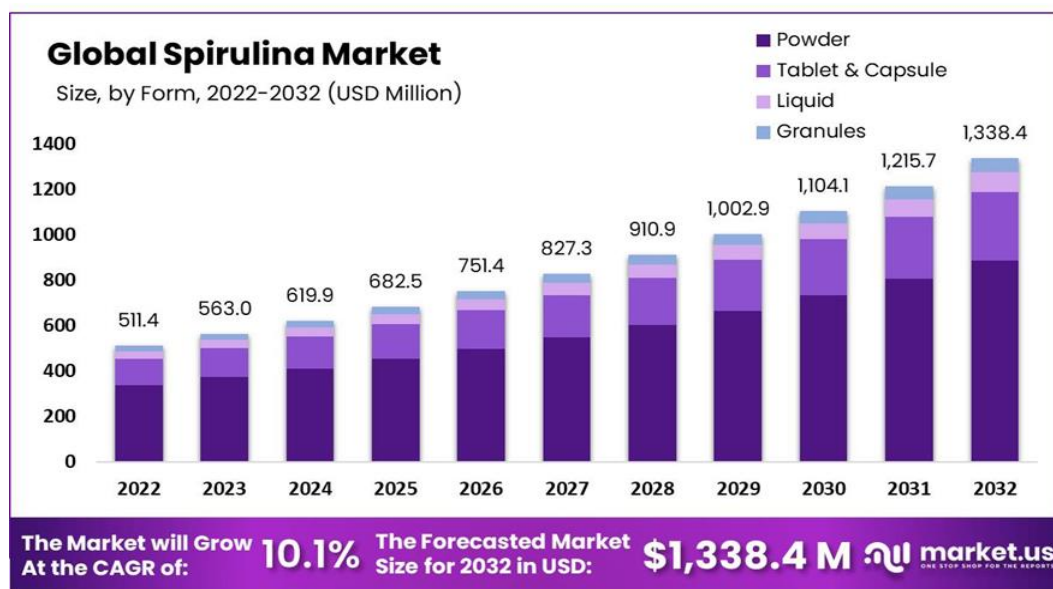
<https://www.sphericalinsights.com/reports/spirulina-powder-market>

North America is expected to be the largest market for the global spirulina market, which is expected to grow at a CAGR of over 38 % during the forecast period. The growth of this market in North America is attributed to high health supplement consumption in countries like the United States and to increasing demand for spirulina in countries such as U.S., and Canada. Europe is expected to be the second-largest market for the global spirulina market, which is expected to grow at a CAGR of over 29 % during the forecast period. The growth of this market in Europe is attributed to increasing demand for spirulina in countries such as France, Germany, the Netherlands, and Russia. Asia Pacific is expected to be the fastest-growing market for the global spirulina market, which is expected to grow at a CAGR of over 18 % during the forecast period. India and China are leading the growth on account of the increasing population and changing lifestyles in these nations. Overall, the market appears promising given the associated health advantages and new product innovations.

**Figure 3. Global Spirulina Powder Market By Regions 2022-2029**



**Figure 4. Spirulina Market Share (%), By Form, 2022-2032**



Based on form, the market for Spirulina is segmented into powder, tablet & capsule, liquid, and granules. Among these, the powder segment was the most lucrative in the global Spirulina market. Spirulina powder’s adaptability makes it seamlessly incorporated into various culinary applications, catering to diverse consumer preferences, spanning from smoothies to baked goods.

**(b) Diversification of national legislations and apparent resultant or potential impediments to international trade:**

Imports and exports of spirulina take place for many applications. However, it would be preferred that the trade in spirulina is carried out under an international criterion based on Codex Standard. Therefore, the new work would provide internationally recognized specific standard to enhance international trade and to

accommodate the importer's requirements. FAO has published a review 2008 on *culture, production and use of spirulina as food for humans and feeds for domestic animals and fishes*<sup>4</sup>.

**(c) International or regional market potential**

The global spirulina market appears promising over the coming years. The Spirulina Market is expanding rapidly due to several major factors. The rising health consciousness among consumers globally and rising demand for natural ingredients, combined with significant investments in R&D for industrial spirulina products, has moved this industry forward.

Spirulina is considered a superfood due to its high protein content and other health benefits. The demand for plant-based and natural food ingredients is increasing rapidly, which works in favor of spirulina. Furthermore, spirulina provides several nutritional and medicinal properties that help boost its consumption. It is a good source of iron, B vitamins, magnesium, and antioxidants. The spirulina market is expected to grow swiftly with rising awareness about these benefits. The development of innovative products containing spirulina extracts will also support market expansion.

**(d) Amenability of commodity to standardization**

The standard will include the characteristics of dried sweet marjoram, composition, quality and packaging criteria.

The characteristics of spirulina for retail sale e.g. composition, quality characteristics, processing, packaging, etc., all lead to adequate parameters for the standardization of the product. Considering of technical information available and a certain degree of harmonization that has already been achieved at national level and international levels on certain aspects relevant to consumer's protection and trade facilitation as mentioned in point b), it is therefore, timely to develop an international harmonized standard for spirulina.

**(e) Coverage of the main consumer protection and trade issues by existing or proposed general standards**

There is no international general commodity standard covering spirulina. The new work will enhance consumer protection and facilitate trade by establishing an internationally agreed and recognized quality standard.

**(f) Number of commodities which would need separate standards including whether raw, semi processed or processed.**

The proposed standard will cover the dried spirulina in its different styles.

**(g) Work already undertaken by other organizations in this field**

FAO Fisheries and Aquaculture Circular No. 1034 FIMA/C1034 (En) ISSN 2070-6065, 2008. A review "A review on culture, production and use of spirulina as food for humans and feeds for domestic animals and fish"

**5. Relevance to CODEX strategic objectives**

The proposal is consistent with the Strategic Plan of the Codex Alimentarius Commission 2020-2025, adopted by the 42nd Session of the Codex Alimentarius Commission, in particular strategic objectives 1.1, 1.2, 2.1, 2.2, 2.3, 3.1 and 3.2. And aims at setting up internationally accepted minimum quality requirements of the product for human consumption.

**6. Information on the relation between the Proposal and other existing CODEX document**

This proposal is a new Codex Standard and is not related to or based on any pre-existing Codex document. This standard will include references to relevant pre - existing Codex texts developed by general subject committees, as follows:

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<sup>4</sup> FAO Fisheries and Aquaculture Circular No. 1034 fima/c1034 (en) ISSN 2070-6065, 2008.a review "a review on culture, production and use of spirulina as food for humans and feeds for domestic animals and fish

- CAC / GL21-1997 “Principles and guidelines for the Establishment and Application of Microbiological Criteria for Foods”.
- CAC / RCP 1-1969 “General Principles of Food Hygiene”.
- Data bases related to the maximum limits for pesticides residues issued by Codex Committee on Pesticides Residues in Food (CCPR).
- Codex Standard 193-1995 “General Standard for Contaminants and Toxins in Food and Feed”.
- CAC/RCP 42-1995 “Code of hygienic practice for spices and dried aromatic herbs”.

#### **7. Identification of any requirement for and availability of expert scientific advice**

No need for expert scientific advice is foreseen at this stage. Published research documents by international bodies will be referred to in the process of preparing the standard.

#### **8. Identification of any requirement for technical input to the standard from external bodies so that this can be planned for**

Technical input from the food and Agriculture Organization (FAO), the International Standards Organization (ISO) may be sought when developing this standard.

#### **9. Proposed timeline for completion of new work, including the start date, proposed date for adoption at Step 5, proposed date for adoption by the Commission**

A five-year timeline is proposed for the completion of the proposed work as listed below:

2024: Preliminary consultations with Codex members

2025: Consideration of the proposed new work at Codex committee

2025: Formation of EWG to discuss project document for new work

2026: Consideration of draft project document for new work at Codex committee

2026: Approval of new work by CAC49

2027: Discuss new work and circulate draft text at a Codex committee for comments

2027: Adoption of draft text at Step 5 at CAC50

2028: Circulate draft text at a Codex committee for comments

2028: Adoption at Step 8 at CAC51

The proposed timetable for the completion of the standard will be submitted after CCEXEC86 approves it.