SPIRULINA SUPERFOOD

1. INTRODUCTION

Spirulina is a spiral-shaped microalga that grows naturally in the wild in warm and freshwater lakes. It is blue-green algae. Dried spirulina contains approximately 60-70 % protein, vitamins A, B, and K. There are multiple benefits of spirulina. It has powerful anti-oxidant, anti-cancer, and anti-inflammatory properties. It is also effective against anemia and controlling blood sugar. Owing to all these properties, spirulina is considered today's superfood. Spirulina thrives in **warm climates** with temperatures typically ranging between **25°C and 35°C**. Uttarakhand, with its favorable climate and water resources, can be suitable for **spirulina farming**, particularly in the **Terai region** (such as **Haldwani**, **Kashipur**, and **Pantnagar**). The Terai region has a climate conducive to spirulina cultivation due to its warmer temperatures during the summer months and the availability of freshwater resources.

2. PRODUCT & ITS APPLICATION

Spirulina reduces LDL cholesterol and aids in wound healing. It is utilized in the health care industry, in medicine, in medicinal preparations, in sericulture and horticulture media, and as a protein supplement for undernourished children and adults. People who wish to manage their obesity buy spirulina tablets since they offer all the necessary nutrients without having too many calories or fats. Since it has no negative effects and doesn't cause habit formation, spirulina is a very popular health food.

The growing awareness of healthy eating, combined with the rising popularity of **superfoods** and **plant-based nutrition**, has contributed to the increasing demand for spirulina in Uttarakhand. Many residents of urban areas, as well as tourists visiting health hubs like **Rishikesh** and **Haridwar**, are interested in spirulina as part of their health regimen. Spirulina products such as powder, tablets, capsules, and health drinks are available in Uttarakhand, but the **cultivation of spirulina algae** is still in its early stages. Most spirulina products are sourced from other regions with established production systems. However, with the state's favorable climate and growing health-conscious population, there is significant potential for expanding spirulina farming and availability in Uttarakhand.

3. DESIRED QUALIFICATION FOR PROMOTER

The promoter may be a Graduate/with a diploma in Life Sciences, Botany, agriculture, or allied disciplines and should possess knowledge about marketing or marketing networks.

4. BUSINESS OUTLOOK AND TRENDS

The spirulina industry in Uttarakhand is in its nascent stages, but it shows considerable potential due to the increasing demand for **nutritious superfoods**, growing health awareness, and the state's favorable agricultural conditions. Spirulina, being a rich source of **proteins**, **vitamins**, **minerals**, and **antioxidants**, is gaining recognition not only in global markets but also in India's health-conscious communities. In Uttarakhand, which is already known for its **tourism** and **wellness industry**, the growth of the spirulina sector is likely to align with the increasing interest in **organic**, **plant-based diets** and **eco-tourism**.

5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY

The market potential for **spirulina superfoods** in Uttarakhand is substantial, driven by the growing health-conscious population, the state's strong wellness tourism sector, and an increasing demand for organic, plant-based products. As awareness of its health benefits spreads, there is an emerging market for spirulina-based products such as powders, tablets, health drinks, and snacks. However, the market faces challenges, including **limited local awareness**, **lack of infrastructure** for spirulina farming, and the need for **specialized knowledge** in cultivation and product manufacturing. Additionally, **marketing issues** like **distribution networks** and **regulatory compliance** may slow the growth of spirulina farming in Uttarakhand.

6. RAW MATERIAL REQUIREMENTS

The production of Spirulina superfood requires a variety of raw materials, as mentioned below:

1. **Clean and Mineral-Rich Fresh Water:** Spirulina requires freshwater that is free from pollutants. Water quality is crucial for spirulina growth, as it needs to maintain the right balance of minerals (such as magnesium and calcium) and proper pH levels (between 9 and 10).

2. Nutrient Medium for Spirulina Growth: The Spirulina thrives in a nutrient-rich environment. The **growth medium** typically consists of a mix of essential nutrients, including:

- **Nitrogen Source**: Often provided by **ammonium bicarbonate**, **urea**, or other nitrogenous fertilizers. Nitrogen is vital for spirulina's protein production.
- **Phosphorus Source**: Sources like **phosphates** (e.g., sodium phosphate) are added to the growth medium to support cell division.
- **Carbon Source**: **Carbon dioxide (CO2)** is essential for spirulina's photosynthesis process. This can be provided through **natural CO2** in the air, or for more controlled environments, additional CO2 supplementation may be required.
- **Micronutrients**: Various trace minerals, including **iron**, **magnesium**, **potassium**, **zinc**, **manganese**, and **calcium**, are required for healthy spirulina growth. These can be provided through **chelated minerals** or **nutrient mixes** available in agricultural supply stores.

3. Algae Culture Starter: A high-quality inoculum or starter culture of spirulina is required to initiate spirulina farming. This small initial spirulina batch will seed the cultivation process and grow into larger quantities.

6. MANUFACTURING PROCESS

The manufacturing consists of:

A) Cultivation

B) harvesting

C) Processing

PROCEDURE:

Selected strains of algae are used for cultivation in constant agitation of water. This is an important parameter in the cultivation of spirulina. Agitation of algae culture is necessary to keep nutrients evenly dispersed and also to expose all the cells to sunlight. The algal biomass is carefully harvested using specially made filters to recover the biomass. The harvested biomass is dried using the cross-flow drier.

The produce obtained is in the form of flakes. It is ground in the pulverizer to get the powder of the desired mesh size.

To get an optimal yield, maintenance of required nutrient level, cell density, culture depth, etc., are critical parameters in the process of spirulina cultivation. The yield of spirulina is expressed as grams per cubic meter per day.

PACKAGING:

Spirulina is packed in capsules. Around 50 or 100 capsules are packed in a bottle and sold.

MANUFACTURING CAPACITY

Cultivation - Three shifts, each of 8 hours duration.

Drying - one shift of 8 hours duration.

The yield of wet biomass per annum would be around 200 metric tonnes which on drying will yield 10 tonnes of the dried product. The time period required for achieving full capacity utilisation is one year.

7. MANPOWER REQUIREMENT

Sr. No	Particulars	No.	No of month in year	Wages/Salaries per month (Rs. In Lakhs)	Annual Expense (Rs. In Lakhs)
1	Production Manager	1	12	25000	3
2	Chemist	1	12	0.17	2.04
3	Skilled Labor	2	12	0.12	2.88
4	Unskilled Labor	1	12	0.09	1.08
	Total				**6.00**

8. IMPLEMENTATION SCHEDULE

Sr. No.	Activity	Time Required (in months)
1	Acquisition of premises	1
2	Construction (if applicable)	1.5
3	Procurement & installation of Plant & Machinery	2.5
4	Arrangement of Finance	1
5	Recruitment of required manpower	1
6	Total time required (some activities shall run concurrently)	3

9. COST OF PROJECT

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
1	Land	-
2	Building (Rented)	0.15
3	Plant & Machinery	4.65
4	Equipment and Furniture Exp.	1.60
5	Misc. Fixed Asset	0.02
6	Preoperative & Preliminary Exp.	0.05
7	Working Capital	2.74
	Total Project Cost	9.21

10.MEANS OF FINANCE

Bank-term loans are assumed @ 60 %

Sr. No.	Particulars	Annual Expenses (Rs. in lakhs)
1	Promoter's contribution	3.69
2	Bank Finance	5.53
	Total	**9.21**

11.LIST OF EQUIPMENT REQUIRED

Furniture & Equipment

Sr. No	Particulars	Unit	Price per Unit(Rs. in lakhs)	Total Amount (Rs. in lakhs)
1	Laboratory Equipment (Microscopes, Nutrient Analysis Tools, Microbial Testing Kits)	-	0.00	0.80
2	Harvesting Equipment (mesh nets, centrifuge, Fine mesh filters or conical filters, pressing machine etc.)	0	0.00	0.30
3	Nutrient Mixing Equipment (Nutrient Tanks and Mixers, Fertilizer Dispensers etc.)	-	0.00	0.20
	Total Rs.			1.60

Sr. No	Particulars	Unit	Price per Unit(Rs in lakhs)	Total Amount (Rs. in lakhs)
1	Paddle wheel and motors	2	0.30	0.60
2	Vibratory Sieve	1	1.10	1.10
3	Cross-flow type tray dryer	1	1.00	1.00
4	Pulveriser	1	0.45	0.45
6	Water Treatment Plant	1	1.50	1.50
Total Amount		0	0.00	4.65

The availability of raw-materials and equipment from local manufacturers is a promising advantage for the entrepreneur. It is essential to carefully choose the right mix of products and suitable machinery and tooling to facilitate modern and flexible processes. Here are some of the suppliers of business equipments an entrepreneur can consider:

1.Gupta Electronics

Dispensary Road, Dehradun City,

Dehradun – 248001, Uttarakhand, India

2. R. C. Electronics 54,

Dispensary Road,

Back Side of Kothali,

Dehradun- 248001,

Uttarakhand, India.

3.Vardhman Instruments and

Chemical Goods Private Limited

Chakrata Road, Dehradun,

Uttarakhand, India.

12.SALES REALISATION

Sr. No	Product	Sales in Percentage	INR
1	Aromatic Candles	25.0%	900000

	Total	**100.00%**	**900000**

13.PROFITABILITY CALCULATIONS

The basis of profitability calculation:

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
A.	Sales realisation	9.00
B.	Cost of production	
i)	Raw materials	0.92
ii)	Utilities	0.17
iii)	Manpower Cost (Salaries/wages)	10.80
iv)	Administrative expenses	0.18
v)	Packaging Cost	0.05
vi)	Material Lost Cost	0.05
vii)	Selling & distribution expenses	0.06
ix)	Rent	0.15
x)	Interest	0.31
	Total (B)	12.69
	Gross profit/loss (A – B)	-3.69
	Less: Depreciation	0.71
C.	PBIT	-4.39
D	Income-tax	-
E	Net profit/loss	-4.39
F.	Repayment (Annual)	0.12
G	Retained surplus (E-F)	-4.51

14.BREAKEVEN ANALYSIS

(Rs. in lakhs)

Fixed cost	
Land & Building Rent	0.15
Depriciation	0.71
Interest	0.31
Manpower	3.24
Total Fixed cost	4.40
Variable cost	
Raw materials	0.92
Utilities	0.17
ManPower	7.56

Administrative expenses	0.18
Selling & distribution expenses	0.06
Total Variable cost	8.89
Contribution margin	**20%**
Break-Even Point in Value	22.01

15.STATUTORY/GOVERNMENT APPROVALS

Setting up a spirulina superfood production unit in Uttarakhand would require several statutory and government approvals to ensure compliance with regulations.

1. Business Registration: Business registration has to be made with the appropriate local authorities within the Local Municipal Corporation or Panchayat.

2. Trade License: A trade license is required to operate a retail business. GST Registration: Goods and Services Tax (GST) registration is a must for taxation purposes

3. FSSAI (Food Safety and Standards Authority of India) Approval: This approval ensures that the product meets the food safety standards laid out by the Food Safety and Standards Act, 2006.

4. Pollution Control Board (State Pollution Control Board - SPCB) Approval: The production unit will require approval from the Uttarakhand Environment Protection and Pollution Control Board (UEPPCB) to ensure compliance with water and air pollution control norms.

5. Organic Certification (As per requirement): If you wish to market your spirulina as organic, you will need to obtain organic certification from recognized bodies such as India Organic (under the National Program for Organic Production - NPOP) or USDA Organic for international markets

16. TRAINING CENTERS AND COURSES

There are few specialized Institutes that provide diploma certification in Spirulina production. The most famous and authenticate Institutions are as follows:

- **Pusa Krishi**

  ZTM BPD, IARI Pusa Campus,

  Delhi-110012

- **Central Food Technologies and Research Institute (CFTRI), Mysore**

  Cheluvamba Mansion, Valmiki Main Rd,

  opp. Railway Museum, Devaraja Mohalla,

CFTRI Campus, Kajjihundi, Mysuru, Karnataka 570020

- **Krishi Vigyan Kendra Dhakrani**

  Herbertpur-Poanta Sahib Rd,

  Vikasnagar, Uttarakhand 248142

The Swayam portal (link: https://swayam.gov.in/) can also be accessed for enhanced learning on business commerce, accounting, production, marketing, and areas of entrepreneurship.

Entrepreneurship programs that help to run businesses successfully are also available from institutes like the Entrepreneurship Development Institute of India (EDII), and their affiliation is all over India.

Disclaimer

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.