Green Entrepreneurship Startups

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CHAPTER – 250

POLICY AND REGULATORY FRAMEWORK FOR GREEN STARTUPS - SPIRULINA

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Abstract---Collaborations between government agencies and green startups can facilitate knowledge sharing, resource allocation and scaling. Spirulina is a great nutritional content and it has several health advantages, the blue-green algae Spirulina has gained recognition as a super food. Spirulina farming offers a compelling return on investment due to its low cost and high-income potential. Schemes implemented by the Indian government to encourage the production of spirulina provide a viable path towards both economic empowerment and the reduction of malnutrition.

Keywords---Green Startups – Spirulina – Subsidies – Cultivation and Marketing

1. INTRODUCTION

The policy and regulatory framework for green startups typically includes a combination of government initiatives, laws and regulations that support and encourage the development of environmentally friendly businesses. Green funding initiatives, specialized funding programs and green banks provide financing options for green

startups. Governments offer tax breaks, subsidies and grants to green startups to help them overcome initial funding challenges. Government priorities purchasing from green startups, providing a market for their products and services. Governments fund R&D in green technologies, supporting innovation in green startups. The training and education programs held by government helps in building a skilled workforce for green startups. In this study we have made an attempt to study the cultivating and marketing of Spirulina.

Spirulina is a multicellular, spirally coiled, blue green algae. It is naturally found in fresh water, brackish waters, marine water, inland saline lakhs, hot springs and moist soil. Biomass of spirulina is rich sources of protein (67%), vitamins, minerals and carotenes. Hence, the US Federal drug Administration recognised spirulina as a supplement of human food and animal feed in 1980.

2. OBJECTIVES OF THE STUDY

❖ To develop knowledge about Spirulina cultivation and marketing.

❖ To begin startups by using spirulina as a base product.

3. SIGNIFICANCE OF THE STUDY

➢The startups and business related to spirulina increases the economy of our nation.

➢The spirulina cultivation brings maximum profit with minimum cost.

➢The value-added products boost the immunity system of human bodies.

➢The maintenance and wastage of spirulina cultivation is less in nature.

3. USES OF SPIRULINA

❖ Spirulina is used as a health food, therapeutic agent and a source of cosmetics.

❖ Medical councils all over the world have recommended to use Spirulina as a supplement food in the diet of under-nutrition children.

❖ In India, Spirulina capsules are available in the trade names EU fit, Nicolina, Recolina and Zyrulina at local medical stores.

❖ Generally, for adults 2 capsules are recommended per day.

4. SPIRULINA AS A SUPPLEMENT ANIMAL FEED

✓Spirulina increases the meat yield of pigs and goat.

✓Calves grow well when they are feed supplement with spirulina.

✓In fish farming the feed with spirulina supplement increases the growth rate and weight of fishes. Ex. Catla, Tilapia in farms uses spirulina for growth.

✓Spirulina increases layering in poultry.

5. SPIRULINA AS A RAWMATERIAL FOR COSMETICS

✓Spirulina is rich in essential amino acids and vitamins A&B which are essential for the growth of the hair.

✓It is used to formulate hair oils which promote hair growth.

✓Phycocyanin a bluish pigment, is extracted from spirulina and used for making herbal lipsticks and face creams.

6. BENEFITS OF SPIRULINA

✓The dried spirulina fusiform constituents are

✓Protein 65% to 67%

✓Carbohydrates 16%

✓Lipids 6.7%

✓Nucleic acids 4.2%

✓It has minerals like

✓Calcium

✓Lysine

✓Phosphorous

✓Cystine

✓Iron

✓Methionine

✓Sodium

✓Phenylalanine

✓Potassium

✓Threonine

✓It has vitamins like

✓Biotin

✓Cyanocobalamin

✓Folic acid

✓Riboflavin

✓Thiamine

✓Tocopherol

✓Carotenes

✓The digestibility of Spirulina SCP is 84%, so it can be digested easily by human system.

✓A 20g of Spirulina consumption can fulfil the daily requirement of vitamins, minerals and amino acids for an adult man.

✓The carotene in the Spirulina prevents the risk of cancer.

7. GOVERNMENT SUBSIDIES

THE NATIONAL HORTICULTURE MISSION (NHM)

✓50% of subsidy for general farmers,

✓75% subsidy for SC/ST and women farmers,

✓The maximum subsidy per beneficiary is Rs. 2.5 lakhs,

✓The eligible farmers should have at least 5000 square meters of land with sufficient water supply and electricity.

❖ **NATIONAL MISSION ON MICRO IRRIGATION (NMMI)**

✓40% of the system cost for Small and Marginal farmers,

✓20% for other farmers,

✓The eligible farmer should have at least 1000 square meter of land with a water source within 500 meters.

❖ Spiral G Project

This is an EU-Funded project that aims to demonstrate the feasibility of a spirulina biorefinery concept in the EU. The project involves developing innovative technologies and processes for producing high value products from Spirulina biomass, such as phycocyanin, polysaccharides, bio plastics, etc. The project also involves creating a network of stake holders and promoting spirulina as a sustainable bio resource.

PICTURES

Spirulina cultivation

Spirulina is cultivated in large scales in artificial ponds or tanks or in oxidation ponds.

Circular open tank

Rectangular open tank

8. MASS CULTURE OF SPIRULINA

o Spirulina is cultured in large scales in artificial ponds or tanks or oxidation ponds.

o Relatively simple and economic media have been used for this purpose.

o Cost effective culture of Spirulina requires improved biomass productivity, better light utilization & efficient CO2 consumption.

o Both open & closed system to grow Spirulina in a large scale.

9. OPEN CIRCULATING SYSTEM

- An open circulating system is man made open tank or shallow pond.
- It may be circular or rectangular in shape.
- The depth of the tank should be in between 25 to 30cms.
- Size of the tank may be 500mz- 5000mz.
- It is built with bricks or concrete and the interior is lined with a sheet of POLYVINYL CHLORIDE(PVC).
- In circular tanks, a stirrer with a rotating arm is kept at the centre to provide enough stirring for the culture.
- On the other hand, in the rectangular tanks a paddle wheel is kept in the tank to stir the culture.
- Usually, the culture tanks are kept open while functioning.

• Sometimes they may be covered with a transparent glass or plastic sheet to prevent contamination.

10. OXIDATION POND SYSTEM

▪ In this method, all solid wastes and suspended particles are removed from the sewage water by primary and secondary treatments.

▪ The sewage water is allowed to flow into an oxidation pond.

▪ A few litres of Spirulina culture inoculated into pond as a starter culture.

▪ Spirulina grows in the natural system and produces a dense mat on the surface of the sewage water.

▪ The biomass is harvested by using special devices that can filter a large amount of sample.

▪ Comparable to other methods this has high maintenance and more labour work.

11. ANOTHER MEDIUM IS SEA WATER

✓In this process the seawater is treated well and the ph of the media is adjusted to 8.5.

✓A medium is filled in the open circulating tank and the tank is inoculated with a small volume of pure Spirulina culture.

✓If it is inside the room the temperature is maintained at 35^0 to 40^0 C which is suitable for the rapid growth of spirulina and forms a bloom in the culture.

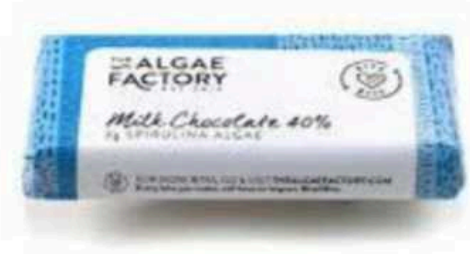
✓The biomass is harvested by filtration using a fine mesh or cloth.

VALUE ADDED PRODUCTS

SPIRULINA HEALTH MIX

Spirulina Health Tablets

Spirulina Protein Powder



Spirulina Choclate Bars

Spirulina Sprouted Bars

Spirulina Peanut Bars

Singapore Made, 1st In Asia To Taste Food Made from Spirulina Algae.

Cakes Made Using Spirulina

Other Snacks Using Spirulina

Cultivation in India

COST COMPONENT	COST (Rs.)
Land and Container	20,000
Culture Medium	5,000/month
Inoculum	500/kg.
Maintenance	10,000/month

Harvesting	5,000/month
REVENUE COMPONENT	**AMOUNT (Rs.)**
Yield	150-180 kg.
Price per kg.	Rs. 600-700
Monthly Revenue	Rs. 90,000-Rs.1,26,000
FINANCIAL METRICS	**AMOUNT (Rs.)**
Total Revenue	Rs. 90,000-Rs. 1,26,000
Total cost	Rs. 20,000 initials + Rs. 20,000 monthly
Net profit	Rs. 70,000 – Rs.1,0,6000 monthly
ROI	350%-530% monthly

12. THE SUCCESS STORY OF SPIRULINA CULTIVATION IN TAMIL NADU

In Madurai, a group of 15 women has embarked on a successful spirulina production venture, managing 40 tanks to yield 150 kg of spirulina monthly. Their operations entails packaging the spirulina into 2-gram sachets for sales to local NGOs, as well as incorporating it into energy bars with millet, jaggery, and sesame to nourish 2000 children daily nearby slums. These innovative boasts impressive cost efficiency with production costs amounting to just 0.01 Euros per child per day, emphasizing a commitment to local production and distribution.

13. RETURN ON INVESTMENT (ROI)

✓Spirulina farming offers a compelling return on investment due to its low cost and high- income potential.

✓On average, 100 square meters of surface area yields 150-180 kg. monthly, fetching price ranging from Rs. 600- Rs. 700 per Kg. Hence, a monthly revenue can reach Rs. 90,000 to Rs. 1,26,000.

✓With total revenue exceeding total cost, the net profit ranges from Rs.70,000 to Rs. 1,06,000 monthly for 100 square meters.

✓Total revenue depends on the yield and price of spirulina.

14. CONCLUSION

Schemes implemented by the Indian government to encourage the production of spirulina provide a viable path towards both economic empowerment and the reduction of malnutrition. With infrastructural and financial assistance, spirulina farming becomes a viable alternative, promoting nutritional security and strengthening local communities-women in particular across the country. This study gives the knowledge about green startups using the spirulina as a base product. India is a significant player in the world market for Spirulina. The Spirulina cultivated in India is primarily exported to the United States, France, and the Netherlands. Currently China holds the title of the world's largest spirulina importers. Spirulina has expiry date too. The unopened Spirulina bag can be stored for about two years. As coin has two sides, the spirulina also has side effects like liver damage, stomach pain, nausea, vomiting, weakness, thirst, rapid heartbeat, shock and even causes death too. The consumption of Spirulina should be taken with the doctor's guidance.