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Spirulina Farming: a Superfood

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Introduction

Superfood is a food that is nutritionally dense, rich in compounds such as vitamins, minerals, antioxidants, and fibres and is considered to provide immense health benefits compared to other eatables. Spirulina is one such rare food. It is crowned a superfood due to its high concentration of vitamins and minerals. Vitamins include A, B, C, and E while minerals like calcium, magnesium, zinc, and selenium are present in abundance. Spirulina is believed to be one of the oldest life forms on earth. Spirulina is multicellular, filamentous blue-green algae, also known as a cyanobacterium ('cyano' means blue). Spirulina is a photosynthesizing cyanophyte (blue-green algae) that grows vigorously. For maximum growth, it requires intense sunlight under high temperatures and highly alkaline conditions and utilizes carbon dioxide dissolved in water as a nutrient source for growth and reproduction.

Spirulina products: powder, tablets and juice

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Spirulina farming:

Spirulina has considerable potential for sustainable development and growth of a country as being a small-scale crop with high nutritional value and less hostile to the environment. It is an emerging profitable agri-business in our country.

Conditions and requirements for Spirulina farming:

- ✓ Spirulina mother culture.
- ✓ Optimum temperature - 30-35 degrees Celsius.
- ✓ Intense sunlight.
- ✓ Alkaline water (pH between 8.5 to 11)
- ✓ Concrete tanks or pots.

Spirulina Cultivation Process: Water with standard micronutrient composition having a pH around 8.5 to 11 is fed into concrete ponds up to a height of 20 to 30 cm (25 cm is ideal water height). Ideally, 30 grams of dry Spirulina is added for every 10 litres of water for steady growth and harvesting. The algae bacterium begins to double in biomass within three to five days and it grows fast by consuming the nutrients in the culture medium. Farmers need to continually check the nutrient content value of the medium and keep adding fresh water at regular intervals for better yields. Full-grown Spirulina turns from light green to dark green. The algae concentration and color are the harvesting indexes.

Harvesting and processing: The pond gets ready for the harvest after five days of the seeding process. Harvesting spirulina involves filtration. The culture is collected in a container and poured onto a cloth, medium flows back into the pond, leaving Spirulina on the cloth. Then it is squeezed to remove the remaining culture medium. After filtration, collected Spirulina is washed thoroughly in distilled water to remove any residue. Once cleaning is done, water is further removed by squeezing and the harvest is now ready for drying. Freshly harvested Spirulina is best in its nutritional content which lasts only around 2 days; therefore it needs to be dried to preserve its nutritional values. Dry spirulina lasts for months with all nutritional contents preserved.

Drying of Fresh Spirulina: Wet spirulina is then grated with a kitchen press grater and pressed on a long clean cloth into thin strands under the sun for quick drying. Solar-powered or electrically operated ovens can also be used for speed drying. The temperature in the oven

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when kept at 60° C takes around 4 hours while 40° C takes about 15 to 16 hours for Spirulina drying.

- Harvesting
- Filtration
- Microscopic image

Image sources: 1. Harvesting- SpiralG project, Franck Hennequart 2. Filtration- Getty images, 3. Microscopic image- " Biology of Microalgae" Michael A. Borowitzka, 2018.

Grinding and Storage: Dried spirulina is now grounded with grinders and converted into soft powder dust which is then packed in distinct weights and clinched for marketing. Vacuum dried and airtight packing is mainly followed to preserve the nutritional qualities for up to three to four years.

One-kg wet culture gives 100 grams of dry powder Accordingly on average, a 20 tank farming business generates 4-5 kg of dry Spirulina powder daily. The production of Spirulina in a month could be around 100 to 130 kg per month. Dry Spirulina powder in the market could earn about Rs. 600/- per kg. Making a farmer earn about 40-45,000/- per month.

Benefits of Spirulina:

- ✓ Blood purifier
- ✓ Immunity booster
- ✓ Increases metabolism
- ✓ Prevents heart disease
- ✓ Improves digestion
- ✓ Protein-rich food
- ✓ Lowers bad cholesterol
- ✓ Source of all essential amino acids
- ✓ Anti-bacterial, anti-fungal and anti-ageing
- ✓ Helps tissue growth and repair

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Spirulina: Boon of nature

1. **Spirulina: a superfood**

Spirulina is packed with a high concentration of vitamins and minerals which act as antioxidants that help protect our cells and tissues from damage caused by free radicals. Not only this, spirulina can help raise energy levels to a great extent by transforming the food eaten into energy. Also, spirulina has a 60% protein content, making it a richer source of protein than most vegetables.

2. **Spirulina: a Spacefood**

For the safety and success of any mission, astronauts' nutritional requirements have proven to be one of the most essential factors. NASA and European Space Agency (ESA) proposed Spirulina to be astronauts' food for long-term space missions. NASA declared that 1 gram (4 tablets) of spirulina is equivalent to nutrients of 1 kilogram of assorted balanced vegetables and fruits.

3. **Spirulina : a Biofertilizer**

Arthrospira platensis (Spirulina) is used as a Biofertilizer as it is a completely natural and healthy fertilizer that has shown a significantly increased level in chlorophyll and carotenoid contents.

Conclusion:

The ever-increasing human population is a serious concern for food security.

Millions of children are malnourished in third world countries of Asia and Africa. Since these countries are rich in solar energy, if spirulina farming gets proper research and implementation it has the potential to become a boon of nature for humankind.