

STEP BY STEP GUIDE ON GROWING SPIRULINA

SPIRULINA DEVELOPMENT INSTITUTE



WHAT WE DO

1. Research and Innovation in Spirulina Cultivation
2. Spirulina-Based Nutritional Products
3. Educational Programs and Workshops
4. Spirulina Research for Pharmaceutical and Cosmetic Applications.
5. Sustainability and Eco-friendly Practices.
6. Spirulina -Based Animal Feed Production
7. Spirulina for Environmental Remediation (e.g;Water Purification)
8. Collaboration with Health and Wellness Brands.
9. Spirulina Research Grants and Funding Opportunities.
10. Spirulina Farming Consultation Services.

IN PARTNERSHIP WITH
THE BLUE ATLAS
PROJECT





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Introduction to Spirulina Farming

Overview

“Spirulina is a nutrient-dense microalgae packed with Proteins, Vitamins, Minerals and Antioxidants”

Spirulina farming offers a sustainable and highly nutritious solution to global food security challenges. Spirulina is a nutrient-dense microalgae packed with proteins, vitamins, minerals, and antioxidants, making it a powerful tool for combating malnutrition, especially in vulnerable populations.

Environmentally, Spirulina requires minimal resources compared to traditional agriculture. It uses less water, land and energy, making it a climate-smart option in regions facing resource scarcity or the impacts of climate change. Additionally, spirulina grows rapidly and can be cultivated in diverse environments, including areas with saline or non-arable land.

Economically, Spirulina farming creates opportunities for local communities by providing a low-cost, high-yielding crop that can be scaled to meet demand. Its versatility in food, health supplements and emergency relief products further increases its value, making spirulina a sustainable solution for addressing both immediate and long-term global challenges.

Benefits of Spirulina Farming



Rich in vitamins and minerals



High protein content



Low and high return on investments



Sustainable and Eco-friendly



Starting a Pond (Per litre of Water)



Sodium Bicarbonate **8.93g/L**



Salt **7.14g/L**



Potassium nitrate **3.14 g/L**



Potassium sulfate **1.57 g/L**



Magnesium sulfate **0.286 g/L**



Phosphate **0.143 g/L**

Daily After Harvest (Per Liter of Water)

- Sodium bicarbonate - 0.179 g/L
- Potassium nitrate - 0.0143 g/L (14.3 mg/L)
- Potassium sulfate - 0.00429 g/L (4.29 mg/L)
- Magnesium sulfate - 0.00429 g/L (4.29 mg/L)
- Phosphate - 0.00571 g/L (5.71 mg/L)
- Iron, teaspoon or 0.071 mg/L.

1. **Timber and Pond Liner**

Advantages:

- **Cost-Effectiveness:** This approach offers a more affordable solution in terms of both materials and labor, making it ideal for budget-conscious projects.
- **Rapid Installation:** The construction process is streamlined, allowing for quicker assembly and faster utilization of the pond.
- **Design Flexibility:** The timber and liner method provides greater versatility, enabling easier modifications or relocation of the pond as needs evolve.
- **Durability:** While cost-effective, timber may require periodic repairs over time, and the pond liner may need replacement as it ages.
- **Liner Maintenance:** It is crucial to ensure proper upkeep of the pond liner to prevent punctures or degradation, which could compromise the pond's integrity.



Pond Size: (7x14)

During sunny days. We have daily Monday to Saturday harvesting and then on Sunday we leave the ponds to rest.

During Rainy cold days, we harvest 4 days a week.

Construction Steps:

1. **Frame Assembly:** Begin by constructing a robust wooden frame that delineates the desired pond area.
2. **Pond Liner Installation:** Securely line the frame with a high quality pond liner to provide effective waterproofing and prevent any potential leakage.



Water and Nutrient Preparation

To ensure the healthy development of spirulina, the following nutrients are required.

1. Sodium Bicarbonate
2. Salt
3. Potassium Nitrate
4. Potassium Sulfate
5. Magnesium Sulfate
6. Phosphate
7. Iron



Nutrient Replenishment Post -Harvest

After each harvest, it is essential to replenish the following nutrients

- Sodium Bicarbonate – 2.5 kg
- Potassium Nitrate – 200 g
- Potassium Sulfate – 60 g
- Magnesium Sulfate – 60 g
- Phosphate – 80 g
- Iron – 1 teaspoon

The process of adding fertilizers after harvest is mixing the fertilizers into water and dilute and place the bucket with a tap to drip into the pond, putting the fertilizers in the process.

After Harvest, mix the fertilizers with water to dissolve them, then use a bucket with a tap to drip the solution slowly into the pond to replenish nutrients.

Optimal Water Conditions

Maintaining ideal water quality is crucial for spirulina growth.
The following parameters should be carefully Controlled.



Temperature: 25-35°C



pH 8.5 – 10.0



Salinity – Keeps salt levels Optimal

Determining How Much Starter Seed Culture You Need

Spirulina starter culture for is determined based on the initial cell density required for optimal growth and pond establishment.

This amount is calculated using **THIS Formula 1.79 g/L** which 1.79 grams of seed culture times the number of litres in your pond.

The resulting figure is what you need to start your pond.

- If the concentration is too low, spirulina may grow too slowly, increasing the risk of contamination by unwanted microorganisms.
- If it is too high, excessive competition for nutrients can reduce growth efficiency.



Contact Blue Atlas for Spirulina Seed Sources

kali@blueatlasproject.org

www.blueatlasproject.org



Maintaining The Pond

1. Dissolve each nutrient separately in a small amount of water before adding it to the pond to ensure proper mixing.
2. Distribute evenly across the pond to avoid nutrient concentration in one area.
3. Stir or agitate the pond using an agitator or manually to promote even nutrient distribution.
4. Monitor pH levels – ideally between 9.5 and 10.5. Adjust by adding more sodium bicarbonate if pH drops.
5. Check water clarity and spirulina density – healthy spirulina should be deep green and evenly spread in the pond.
6. Ensure aeration or circulation to prevent stagnation.



Weekly Maintenance Checks

- Inspect pond structure for leaks or debris.
- Measure nutrient levels to ensure a balanced environment.
- Observe spirulina health – slow growth or color changes may indicate imbalances.
- Clean filters and pumps to maintain water flow and aeration efficiency



Growing Conditions and Ideal Environment



Climate Requirements

Spirulina thrives in hot, sunny environments. The optimal conditions are temperatures between 30°C - 35°C. Spirulina grows best when it receives at least 8-10 hours of sunlight per day.

Water Quality

Maintain clean water with proper pH, temperature, and nutrient levels to support Spirulina growth.

Agitation

Constant agitation is essential for spirulina cultivation. This can be done using a mechanical agitator powered by electricity or solar energy.



Harvesting and Processing

Harvesting Schedule

Start harvesting at 6:00 AM every day. By 11AM, the spirulina should be ready for collection.

Expected Yields

- 20 Kg on Sunny Days



Processing Steps

- Harvesting: Use a scoop or net to collect the Spirulina.
- Pressing: After collection, press the spirulina to remove excess water.
- Drying: Spread the spirulina on drying racks to dry under the sun or use a mechanical dryer.



Harvesting Schedule

- Store in water proof pouches or containers to ensure no mold or humidity. Mark with the harvest date. Dry spirulina is easy to see, by eyes. Dry Spirulina is also to mill into powder.



How to Determine How Much To Harvest Daily

To determine how much spirulina to harvest daily, you should consider growth rate, pond density, and environmental conditions.

Ideally you should harvest **1.43 g of wet spirulina per liter per day** if the following are followed

1. Monitor Biomass Density

- Use a Secchi to check water transparency.
- If the depth at which the disk disappears is less than 2 cm, spirulina is too dense and needs harvesting.
- If it's more than 4 cm, growth is slow, and you may need to reduce harvests.

2. Measure Growth Rate

- Spirulina typically doubles every 2–5 days, depending on sunlight, temperature, and nutrients.
- Record how much you harvest and check if the pond recovers fully by the next day.
- If spirulina does not regrow as expected, reduce harvest amounts slightly.

3. Adjust Based on Weather & Season

- On hot, sunny days, spirulina grows faster, allowing for large daily harvests.
- During cold or rainy days, growth slows, so reduce harvests

4. Check Pond Surface Coverage

- A healthy pond should have evenly spread spirulina without large clumps or clear areas.
- If spirulina starts forming thick mats, it's time to increase harvest frequency.
- If the water looks clearer than usual, reduce harvesting to avoid depleting the culture.

5. Maintain Balanced Replenishment

- Ensure the nutrients you add daily match what's removed through harvesting.
- If spirulina starts growing too thick, increase harvest size or frequency.
- If growth slows or light penetration increases, reduce harvests until spirulina regains density.

1. Agitator

- **Purpose:** Keeps spirulina suspended evenly in the water, ensuring proper circulation and growth.
- **Types:** Can be **electric** or **solar-powered** depending on energy needs and available resources.
- Electricity requirements are determined by unique size of the pond, and agitator.
- **Importance:** Prevents clumping and helps maintain optimal growth conditions by providing uniform mixing of water and nutrients.

Agitation Guidelines: Agitate strictly after harvest. Agitate all day during hot days and during rainy days. One may not necessarily agitate all day

2. Water Pump

- **Purpose:** Essential for transferring water into the pond during setup and for pumping spirulina from the pond into the harvester after cultivation.
 - **Types:** Available in electric or solar-powered models, depending on the setup and energy efficiency goals.
 - **Importance:** Ensures that water circulation remains consistent, which is crucial for maintaining healthy spirulina conditions.
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3. Drying Racks or Dryer

- **Purpose:** Used to dry harvested spirulina to preserve its nutritional value and extend shelf life.
 - **Types:** Can be **manual drying racks** or **mechanical dryers** (e.g., dehydrators or ovens).
 - **Importance:** Efficient drying ensures the spirulina can be stored and used in powdered form, maintaining its quality for later use.
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4. Harvester

- **Purpose:** A mechanical tool used to collect spirulina from the pond after it has grown to a harvestable density.
 - **Types:** Can be manual or motorized, depending on the scale of production.
 - **Importance:** Facilitates the efficient extraction of spirulina while minimizing damage to the culture and ensuring high yields.
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5. Pressing Machine

- **Purpose:** Removes excess water from harvested spirulina to improve the drying process and reduce the weight of the biomass

Frequently Asked Questions (FAQs)

Q1: How long does it take for spirulina to grow?

Spirulina takes 5 -7 days to grow to a harvestable size under optimal conditions.

Q2: Can spirulina be grown in small ponds?

Yes, spirulina can be cultivated in small, controlled ponds.

Q3: What is the shelf life of dried spirulina?

Properly dried and stored spirulina can last for up to one year.

Q4: What are the optimal conditions for spirulina growth?

Spirulina thrives in warm temperatures (25 -35°C), a pH range of 8.5-10.0, and in water with adequate salinity.

Q5: Can spirulina be grown without using artificial light?

Yes, spirulina can grow using natural sunlight as long as it receives sufficient ^{light} Exposure for photosynthesis.

Q6: What equipment is needed to grow spirulina?

Essential equipment includes an agitator, water pump, harvester, drying racks or dryer, and a pressing machine to ensure efficient cultivation and harvesting.

Q7: How often should the water be replaced in a spirulina pond?

Water should be replenished regularly to maintain the right nutrient levels and water quality, though complete replacement is not necessary every day.

Spirulina Farming Kit Requirements

Basic Kit Components

Starter Culture (seed Spirulina)

Pond Liner

Water Pump

Nutrients (as outlined above)

Agitator

Pressing Machine

Drying Racks or Dryer

Additional Equipment

Temperature and pH testing tools

harvesting tools (scoops or nets)

Empower your farm, Transform your Future!

Discover the incredible potential of Spirulina – a super food packed with nutrients and unmatched benefits. This guide is your gateway to sustainable spirulina farming. Join the spirulina revolution and grow a product that boosts your income, improves nutrition and protects the environment.

“This guide transformed the way I approach farming. Growing spirulina has never been this rewarding.” – **Steven Mugisa, Farmer**

“A must-read for every farmer! It’s practical clear, and inspires confidence to start spirulina farming.” – **Diana Karungi, Agribusiness Owner**

“I couldn’t believe how much I learned from this guide. It’s more than a manual – it’s a game changer” – **Grace Kitaka, Agriculture trainer**

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