A Study on the Relationship Between Freshwater Algae Species and Water Quality in a Pond Within Thung Khai Botanic Garden, Trang Province

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Abstract

This research aims to (1) study the relationship between freshwater algae species and water quality in ponds within Thung Kai Botanical Garden, Trang Province, (2) analyze the factors affecting the occurrence of different freshwater algae, including temperature, pH, water transparency, and dissolved oxygen levels, and (3) classify the algae species found, study their morphological characteristics, and the characteristics of the water source to use as a bioindicator for water quality assessment. Water and algae samples were collected from three survey points over a 3-week period to analyze water quality parameters. The results showed that water quality varied at each point. Points 1 and 2 had higher pH and temperature values, with Spirogyra (green filamentous algae) found, while point 3 had higher water transparency and lower pH, with Fragilaria (yellow-brown filamentous algae) found. The study indicates that water quality directly affects the distribution of algae, with Spirogyra being found in water with higher pH and temperature, and Fragilaria found in water with higher transparency and lower pH. Additionally, algae can serve as a bioindicator for water quality assessment, providing important information for managing and conserving water sources to maintain ecological balance in the long term.

Keywords: Freshwater algae, water quality, bioindicator, Thung Kai Botanical Garden

Study Location

Pond at Thung Khai Botanic Garden, Trang Province
FJ9Q+36W Thung Khai ,Yan ta khaw, Trang
(7.4677492, 99.6380671)

Introduction

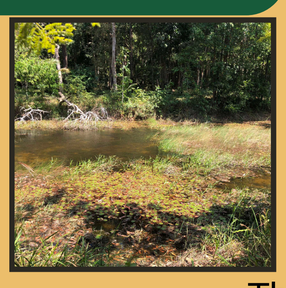
Research Questions

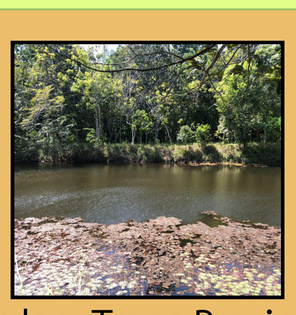
1. How is the composition of freshwater algae species related to the water quality in the pond with in Thung Khai Botanic Garden, Trang Province?
2. Do physicochemical factors, such as temperature, pH, water transparency, and dissolved oxygen levels, influence the occurrence of different algae species in the aquatic environment?
3. How can the freshwater algae species identified in the study area serve as bioindicators for assessing water quality in natural water bodies?

Research Hypotheses

1. The composition and distribution of freshwater algae in the pond at Thung Khai Botanic Garden, Trang Province, are linked to water quality and physicochemical factors such as pH, transparency, and dissolved oxygen.
2. Temperature, pH, water transparency, and dissolved oxygen are key factors influencing algae distribution in aquatic ecosystems.
3. Freshwater algae can serve as effective bioindicators for assessing water quality in natural water bodies.

Study Area





Thung Khai Botanic Garden, Trang Province

Materials

Temperature

Dissolved oxygen(DO)

Universal Indicator

Container used to collect algae

Forcep

CU smartlens

Turbidity meter

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Research Methodology

1. Water Temperature Measurement - Measured at 10 cm depth using a Temperatur , three times and average.
2. Water pH Measurement - Using pH test strips , measured three times and a averaged.
3. Measure the dissolved oxygen(DO) in water - Using (DO) test , measured three time.
4. Measure water turbidity - Using the turbidity meter with collected water until the base is no longer visible.
5. Classify algae - Using CU Smartlens with 20x magnification to observe the morphological characteristics of freshwater algae.

Research Findings

Water Temperature Measurement

Survey No.	Water Temperature (°C)		
	Point 1	Point 2	Point 3
1	30	30	29
2	23	21	23
3	25	23	25
Average	26	24.67	25.67

Water pH Measurement

Survey No.	pH Levels in Water		
	Point 1	Point 2	Point 3
1	7	6	6
2	7	7	6
3	6	5	5
Average	6.67	6	5.67

Measure the dissolved oxygen(DO)

Survey No.	Oxygen Levels in Water (mg/L)		
	Point 1	Point 2	Point 3
1	15.0	15.0	11.5
2	8.0	10.5	4.5
3	7.5	11.5	12.5
Average	10.17	12.33	9.5

Measure water Transparency

Survey No.	Water Transparency (cm)		
	Point 1	Point 2	Point 3
1	77.7	>100	100
2	65.8	>100	90.5
3	67.5	>100	86.9
Average	70.33	>100	92.33

Classify algae

Survey Point	The types of freshwater algae found in water sources.			
	Freshwater Algae	Characteristics of Freshwater Algae	Image from Smart Lens (20x Magnification)	Image of the Found Location
1	*Spirogyra*	Filamentous, Green		
2	*Spirogyra*	Filamentous, Green		
3	*Fragilaria*	Filamentous, Yellow-Brown		

Survey Point	The relationship between algae and water quality.		
	Freshwater Algae	Image from Smart Lens (20x Magnification)	Water Quality
1	*Spirogyra*		Average Oxygen Level: 10.17 mg/l pH: 6.67 Average Temperature: 26°C Water Transparency: 70.33 cm
2	*Spirogyra*		Average Oxygen Level: 12.33 mg/l pH: 6.0 Average Temperature: 24.67°C Water Transparency: >100 cm
3	*Fragilaria*		Average Oxygen Level: 9.5mg/l pH: 5.67 Average Temperature: 25.67°C Water Transparency: 92.33 cm

Algae Species and Water Quality Indicators

Freshwater Algae	Image from Smart Lens (20x Magnification)	Characteristics	Water Quality Relationship	Pollution Level Indicator
Spirogyra		Filamentous, Green	High pH, Moderate Oxygen Levels	Clean Water
Fragilaria		Filamentous, Yellow-Brown	Clear Water, Low Oxygen Levels	Water Starting to Degrade

Research Results

The study on the relationship between freshwater algae species and water quality in the Thung Khae Botanical Garden pond, Trang Province, found that water quality directly influences the types of algae present. The main factors affecting algae growth include pH, dissolved oxygen levels, temperature, and water transparency. In water with high pH and high temperature, Spirogyra was observed, while in water with low pH and high transparency, Fragilaria, which thrives in low-oxygen water, was found.
This study demonstrates that algae can serve as biological indicators for assessing water quality, as changes in algae species and abundance reflect water quality variations. Spirogyra was found in high-quality or clean water, whereas Fragilaria was present in deteriorating water. The use of algae as biological indicators effectively monitors water quality and detects changes in pollution levels.

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