Abstract

Researtch title : Factors affecting the density of Cerithidea cingulata Samran Beach, Hat Samran District, Hat Samran Subdistrict, Trang Province

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This research aimed to study the factors affecting the density of Cerithidea cingulata at Samran Beach, Hat Samran District, Trang Province during November 2024-January 2025 by setting the sampling points of Cerithidea cingulata in the mudflat area divided into 10 lines, each line 200 meters apart. The results of the study found that Cerithidea cingulata lives in sandy loam and loamy sand soils that are at the same level as the sediment surface until the depth does not exceed 15 centimeters. The average number of Cerithidea cingulata is 416 individuals/square meter in November 2024, with the highest number of 1,152 individuals/square meter. In January 2025, the highest number of 380 individuals/square meter was found. From the study of water quality in November It was found that the water source has a Temperature of 28.5 ˚C, salinity of 26.5 ppt, pH of 5, Dissolved Oxygen of 8.5 mg/l, Alkalinity of 130mg/l. In January, it was found that the water source has a Temperature of 31 ˚C, salinity of 28 ppt, pH of 6 2, Dissolved Oxygen of 4.0 mg/l, Alkalinity of 145mg/l. It was found that the increase in Temperature, salinity, Dissolved Oxygen and pH and the study of the quality of the soil sediment found that the first area survey (November) in the area with a high density of Cerithidea cingulata found that the soil temperature was 28.5 ˚C, the soil salinity was 4259 ppt, the soil pH was 7.70 and there was low organic matter in the soil. And the soil color is 7.5 YR 4/1. The second survey (January) in the area with a high density of Cerithidea cingulata found that the soil temperature was 29.5 ˚C, the soil salinity was 4179 ppt, the soil pH was 7.07, the soil organic matter was very low, and the soil color was 7.5 YR 3/1. The analysis of the relationship between the amount of Cerithidea cingulata was in the opposite direction to the water quality, consisting of temperature, acidity-alkalinity, dissolved oxygen, and the sediment quality, consisting of organic matter, pH, and salinity, was in the same direction as the water quality.

Keywords : Cerithidea cingulata , Density

Acknowledgements

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Introduction

Samran Beach is located in the south of Trang Province. To the north, it borders Kantang and Palian Districts. To the east, it borders Palian District. To the south, it borders the Strait of Malacca. To the west, it is a flat plain, lowland, and coastal area of the Andaman Sea. The beach is approximately 18 kilometers long and covers a total area of 224 square kilometers. It is divided into 3 sub-districts. Although it is a small district, it is a source of abundant natural resources. Hat Samran Sub-district, Hat Samran District, Trang Province, in the area of Hat Samran Beach, there are many types of shellfish, such as Cerithidea cingulata, Pa shellfish, or other shellfish. Villagers along Hat Samran Beach or nearby areas will use the low tide to collect shellfish to use as food and generate income for themselves and their families. The team has studied the factors affecting the density of Cerithidea cingulata.

Researtch objective

1. To study the quality of water that affects the density of Cerithidea cingulata, such as studying the temperature in the water, the salinity of the water, the pH value of the water, the amount of oxygen dissolved in the water, the alkalinity of the water.

2. To study the quality of the soil that affects the density of Cerithidea cingulata, such as studying the temperature in the soil, the salinity in the soil, the pH value of the soil, the organic matter in the soil, the color of the soil, the structure of the soil.

Researtch questions

1. Does water quality affect the density of Cerithidea cingulata? How?

2. Does soil quality affect the density of Cerithidea cingulata? How?

Researtch hypothesis

1. Good water quality results in high density of Cerithidea cingulata

2. Good soil quality results in high density of Cerithidea cingulata

Materials and equipment and methods of conducting research

measuring tool

1) Thermometer

2) PH meter

3) Litmus Paper

4) HANNA alkalinity test kit

5) Digital Salinity Meter

6) Dissolved Oxygen Test Kit

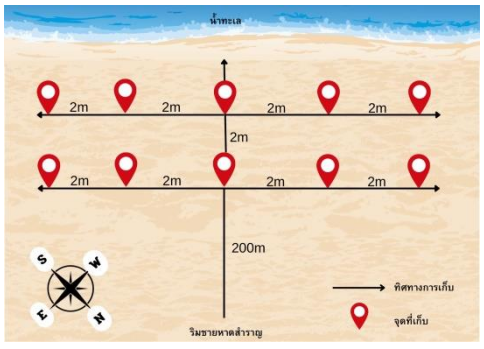
GLOBE testing methodology

Soil Measurement Methods Pedosphere (Soil)

Hydtosphere Measurement Methods

Study point determination

At Hat Samran, Hat Samran District, Hat Samran Subdistrict, Trang Province, soil samples were collected randomly during November and January for 2 months. Then, soil samples were collected 200 meters down from the beach and soil samples were collected in the northeast, northwest and southeast directions, 2 meters apart until no Cerithidea cingulata was found.



Method of action

1. Research preparation steps

1) Define the research topic, select the topic to be studied

2) Research, collect knowledge and theories related to the research

3) Determine the objectives of the research study

4) Determine the sampling points in the area

2. Procedure

1) Plan a joint research project within the group

- Start collecting soil samples on November 30, 2023

- Collect once a month for 2 months

2) Survey the research area

- Go to the field with a pagoda to collect soil and water samples for study

3) Start collecting samples to measure related factors that need to be studied

Measure geographic coordinates, soil temperature, soil salinity, soil pH, soil organic matter, soil color, soil structure and soil adhesion, water temperature, water salinity, water alkalinity, water pH, water oxygen, using the study time from 14.00-17.00 hrs.

- Collect soil and water samples for GLOBE method:

1. Determine water sampling points and Cerithidea cingulata density survey areas.

2. Collect samples once a month, collecting 2 samples in total using soil containers and water bottles.

3. Measure oxygen levels in water using oxygen test kits.

4. Measure water temperature using a thermometer at a depth of 10 cm, wait 5 minutes, read the values and record the values.

5. Measure the pH of water by dipping the pH test kit into the water for 30 seconds, read the value and record the results.

6. Measure the salinity of water using a salinity meter, test from the collected water, read the value and record the results.

7. Measure the alkalinity of water by collecting a water sample near the point where the water temperature is measured, test from the collected water, read the value and record the results.

8. Measure the soil structure by collecting soil samples in various ways, measuring the size, shape and recording the data on the measurement data record sheet.

9. Measure the soil color by picking up soil pellets from the soil sample, observing the color of the soil and recording it on the data record sheet.

10. Measure the soil temperature by dipping a standard thermometer into the soil, wait 2 minutes, read the value and record the value.

11. Measure the acidity-alkalinity of the soil by weighing a 20-gram soil sample, pouring it into a beaker, adding water to get a ratio of soil to water of 1:1. 3. Use a glass rod to stir the soil for 30 seconds and leave it for 3 minutes until the soil in the beaker precipitates. Or place the pH pen that has been adjusted to the standard value in a clear water area, wait until the value is stable, then read the pH value and record the results.

Analysis and conclusion of research

1.) Analyze the obtained data and read the values of factors affecting the density of Cerithidea cingulata. The statistics used in data analysis are: Soil temperature, soil salinity, soil pH, soil organic matter, soil color, soil structure Water temperature, water salinity, water alkalinity, water pH, water oxygen

2.) Create a graph showing the average value of the comparative data

3.) Summarize the experimental results

Research result

Geographic coordinates

The study area of Hat Samran, Hat Samran District, Hat Samran Subdistrict, Trang Province has the coordinates as shown in Table 1.

Table 1 Geographic coordinates

zone	Geographic coordinates	
	Latitude (N)	**Longitude (E)**
Hat Samran, Trang Province	7.236904	99.532752

Density of Cerithidea Cingulata

Table 2 Density of Cerithidea Cingulata per square meter

Times	Average number of Cerithidea Cingulata (square meters)	Average number of Cerithidea Cingulata (square meters)
1	1152	80
2	380	52

From the study of Cerithidea Cingulata density in each area with different densities, it was found that in the area with high Cerithidea Cingulata density in the first round, there were 1,152 individuals per square meter and in the second round, there were 380 individuals per square meter. In the area with low Cerithidea Cingulata density in the first round, there were 80 individuals per square meter and in the second round, there were 52 individuals per square meter. This shows that the Cerithidea Cingulata population in the area with high density in the second round decreased by 68% from the first round. The Cerithidea Cingulata population in the area with low density in the second round decreased by 35% from the first round.

Water quality

Table 3 Water temperature, water salinity, water pH, dissolved oxygen and water **alkalinity**

Times	average				
	Temperature (˚C)	Saltiness (ppt)	Dissolved Oxygen (mg/l)	Alkalinity	pH
1	28.5	26.5	8.5	130	5
2	31	28	4.0	145	6

From the summary table of the first survey results, it was found that the water source had a temperature of 28.5 ˚C, salinity of 26.5 ppt, pH of 5, dissolved oxygen of 8.5 mg/l and alkalinity of 130mg/l. The second survey found that the water source had a temperature of 31 ˚C, salinity of 28 ppt, pH of 6.2, dissolved oxygen of 4.0 mg/l and alkalinity of 145mg/l, which indicates that in the survey, the dissolved oxygen decreased by 47% and the alkalinity increased by 11%, resulting in a decrease in the density of Cerithidea Cingulata.

Soil quality

Table 4 Soil temperature, soil salinity, soil pH, soil organic matter and soil color

	average					
	Areas with high Cerithidea Cingulata densities		Areas with low Cerithidea Cingulata densities		Non-density area Cerithidea Cingulata	
Times	1	2	1	2	1	2
temperature (˚C)	28.5	29.5	28	30	29	31.5
Saltiness(ppt)	4179	4259	4314	4829	4196	4791
pH	7.70	7.07	7.73	7.58	7.77	7.49
Soil organic matter	low	Very low	low	Very low	Very low	Very low
Color of soil	7.5 YR 4/1	7.5 YR 3/1	7.5 YR 4/1	7.5 YR 3/1	7.5 YR 4/1	7.5 YR 4/1

From the table, it can be concluded that the first survey (November) in the area with high snail density found that the soil temperature was 28.5°C, the soil salinity was 4259 ppt, the soil pH was 7.70, the soil organic matter was low, and the soil color was 7.5 YR 4/1. The second survey (January) in the area with high snail density found that the soil temperature was 29.5°C, the soil salinity was 4179 ppt, the soil pH was 7.07, the soil organic matter was very low, and the soil color was 7.5 YR 3/1. It was found that the decrease in salinity, soil organic matter, and pH caused the density of Cerithidea Cingulata to decrease.

Soil structure and soil adhesion

Table 5 Soil structure and soil adhesion

Times	Soil structure			Soil adhesion		
	Areas with high Cerithidea Cingulata density	Areas with low Cerithidea Cingulata density	Area No density of Cerithidea Cingulata	Areas with high Cerithidea Cingulata density	Areas with low Cerithidea Cingulata density	Area No density of Cerithidea Cingulata
1	SANDY LOAM (SL)	LOAMY SAND (LS)	LOAMY SAND (LS)	Friable	Friable	Friable
2	SANDY LOAM (SL)	LOAMY SAND (LS)	LOAMY SAND (LS)	Friable	Friable	Friable

From the table, it can be concluded that the areas with high density of Cerithidea Cingulata live in the sedimentary soil with the characteristics of SANDY LOAM (SL), and the areas with low density of pagoda snails and areas with no density of Cerithidea Cingulata live in the soil with the characteristics of LOAMY SAND (LS). The soil cohesion in each area is of the Frible type.

Summary and discussion of research results

1. Density of Cerithidea Cingulata

From the study of the density of Cerithidea Cingulata in each area with different densities, it was found that the density of Cerithidea Cingulata in November 2014 was the highest at 1,152 individuals/sq.m., followed by 80 individuals/sq.m., and in January 2025, the highest at 380 individuals/sq.m., followed by 52 individuals/sq.m. Pagoda snails in areas with high densities in January decreased by 68% from December. The snails in areas with low densities of pagodas in January decreased by 35% from November.

2. Water temperature, water salinity, pH, dissolved oxygen, and water alkalinity

From the study of water quality in November The water source was found to have a temperature of 28.5°C, a salinity of 26.5 ppt, a pH of 5, and a dissolved oxygen of 8.5 mg/l. The alkalinity was 130 mg/l. In January, the water source was found to have a temperature of 31°C, a salinity of 28 ppt, a pH of 6.2, and a dissolved oxygen of 4.0 mg/l. The alkalinity was 145 mg/l. It was found that the increase in temperature, salinity, dissolved oxygen, and pH caused the density of the snails to decrease.

3. Soil temperature, soil salinity, soil pH, soil organic matter, soil structure, and color

From the table, it can be concluded that the first survey (November) in the area with a high density of snails found that the soil temperature was 28.5°C, soil salinity was 4259 ppt, soil pH was 7.70, and soil organic matter was low. And the soil color is 7.5 YR 4/1. The second survey of the area (January) in the area with a high density of shellfish found that the soil temperature was 29.5°C, the soil salinity was 4179 ppt, the soil pH was 7.07, the soil organic matter was very low, and the soil color was 7.5 YR 3/1. It was found that the decrease in salinity, soil organic matter, and pH caused the density of the shellfish to decrease. In the area with a high density of shellfish, the shellfish will live in the soil with the characteristics of SANDY LOAM (SL), and in the area with a low density of shellfish and the area with no density, the shellfish will live in the soil with the characteristics of LOAMY SAND (LS). As for the soil adhesion in each area, it is a Frible adhesion.

Reference documents

Study of sustainable management of cockles in 5 villages of Trang Province (Assistant Professor Nipon Jaipleum)

Water quality for coastal aquaculture Songkhla: Mongkol Printing (Khanit Chaiyakha and Kanit 1994)

Sunan Huaycharoen and Ba Pranom Benchamalai 1991 Some environmental conditions affecting the reproduction of cockles Academic paper No. 11/1991, Samut Prakan Coastal Aquaculture Development Center, Department of Fisheries

1. **IAM A DATA SCIENTIST**

This project clearly uses the data scientist approach by using the principles of data collection, analysis, andconclusion to obtain accurate data by collecting scientific data collection methods such as random sampling of soil and fivein areas with different densities to measure the quality of cool and water quality to find the factors affecting the density of pagoda snails. The analysis of the relationship of pagoda snails has a relationship in the opposite direction of water quality, consisting of temperature, acidity, oxygen dissolved in water, soil quality, and sediment, consisting of organic matter, pH, and salinity, which has a relationship in the same direction as water quality.Salinity has a relationship in the same direction as water quality and is then summarized in a clear table.

2. **I AM A PROBLEM SOLVER**

In this project, the study of factors affecting the density of pagoda snails, which are snails that can generate income for local fishermen. During the survey of the project area, it was found that in the 2 surveys, the density of pagoda snails decreased. The factors that affected were:Water quality factors, with the amount of oxygen dissolved in the water decreasing and the alkalinity increasingSoil quality factors, with the pH value decreasing, salinity increasing, and organic matter decreasing in the soil. The decreasing density of pagoda snails will result in a decrease in income for fishermen who are in the jelly trade. The study found the problematic factors that affected the density of pagoda snails, leading to solutions that reduced the density of pagoda snails, such as:Increased seahorse milk quality control

3. **I AM A COLLABORATOR**

The success of this project is the collaboration of many parties, both the research team and related agencies.This shows the importance of being a good collaborator. The researcher's teamwork has divided the tasks.The research team consists of 3 students who jointly planned, designed the experiment, collected data, analyzed the results, and concluded the main points. The advisor played an important role in the goat herding process.The research process, sample collection, and data analysis were supported by Wichian Mat School and the Wichian Mat School's special classroom for providing a budget, equipment, and academic support.The villagers and fishermen in the area of Samran Beach provided information about the high and low tides, showing that quality research requires cooperation from many parties, not just working alone but also exchanging knowledge, helping each other analyze and solve problems creatively, and making this project a success

Appendix

Picture 1 , 2 Measurement of water hardness.

Picture 3. Measurement of oxygen in water.

Picture 4. Water temperature measurement.

Picture 5. Collecting water for water quality testing.

Picture 6. Soil weighing

Picture 7 pH measurement of water

Picture 8. Measurement of organic matter in soil.

Picture 9. Soil temperature measurement.