A Study of microplastics in the soil, water and oysters (*Crassostrea belcheri*) in Trang, Thailand.

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Abtract

The objective of this research was to study the amount, size, shape, and color of microplastics in coastal soil in the northern, beside, and southern areas of oyster farm. To study the amount, size, shape, and color of microplastics in seawater at different depths. and study the amount, size, shape, and color of microplastics in the digestive tract, body parts and the water inside the shells of oysters (*Crassostrea belcheri*) grown at different depths found that large plastics were mainly found in coastal soils. and found microplastics resulting from decomposition or breakage of large pieces of plastic and from the study of microplastics in seawater It was found that microplastics in the surface of the water were more than those in the deep water, 4.3 ± 1.45 pieces per 300 ml of water. A study of microplastics in the oyster, body parts, digestive tract parts. and the water inside the oyster It was found that oysters raised near the surface of the water were able to find more microplastics than those raised in deep water, 19.8 ± 2.41 pieces per 6 oysters. Because microplastics are small and light in salty brackish water, they float near the surface of the water. The majority of fibers found are blue, black, clear, and red. These colors come from fishing nets, fishing equipment, and plastic waste from the community.

Keywords : *Microplastics, White-jawed oysters (Crassostrea belcheri), Depth level*

Research questions

1. Coastal soil around oyster farm. Is there any microplastic contamination?
2. Seawater in the area where oysters are grown. Is there any microplastic contamination or not?
3. oysters raised in farm. Is there microplastic contamination in the area of Ban Tha Rua, Wang Won Subdistrict, Kantang District, Trang Province?

Objectives

1. To study the amount, size, shape, and color of microplastics in coastal soil around farm used in oyster farming.
2. To study the amount, size, shape, and color of microplastics in seawater at different depths. together in the area where oysters are grown.
3. To study the amount, size, shape, and color of microplastics in the digestive tract, the body parts and the water inside the shells of oysters are grown at different depths.

Hypothesis

1. The amount, size, shape, and color of microplastics in coastal soil in the area north of farm, beside farm, and south of farm.
2. The amount, size, shape, and color of microplastics in seawater at different depths is different.
3. The amount, size, shape, and color of microplastics in the digestive tract, body parts and the water inside the shells of white oysters grown at different depths is different.

Introduction and Review of Literature

oysters (*Crassostrea belcheri*) are bivalve oysters (Bivalvia) that are generally popular among consumers. and is economically important Because it has good taste Has high nutritional value And, in most cases, the way to consume this type of shellfish is to consume it fresh. Without going through any cooking process. This species of oyster can still be found everywhere in the area of Trang Province. The oyster's filter feeding characteristic is that it is not possible to distinguish what type of food it eats plant plankton, animal plankton. or other contaminants as a result, there may be other contaminants remaining inside the oyster (Ponnapa Saelee et al. 2021). Contaminants in the sea that are close to us and can be seen as problems are microplastics, which are an environmental problem. that is continually increasing So slowly that people didn't pay attention and saw the obvious problems.

Microplastics are an environmental problem that has received much attention in recent years because it can cause impacts on the environment and human health (Eriksson & Burton, 2003; OSPAR, 2009; Anthony, 2011; Wright et al., 2013). It was found that each year there are a large amount of microplastics released into water sources around the world. approximately 4.8 to 12.7 million tons (UNEP, 2016). These causes result in water resources and the sea is contaminated with microplastics. Microplastics are as small as 5 millimeters to a micrometer in size. And can remain within small living things that eat food such as microorganisms, plankton, and their consumption in the food chain causes the residue of microplastics to increase continuously and ultimately affects humans.

Microplastic contamination in shellfish can now be found in many countries around the world, including Thailand, for example in France. and China found microplastic contamination in oysters. (Cauwenberghe & Janssen, 2014; Fang et al., 2019) In Thailand, research was conducted in the Ang Sila, Bang Saen, and Samae San beaches in Chonburi Province and found that microplastic contamination could be found in oysters and mussels. (Thushari et al., 2017) In addition to microplastic contamination in shellfish, It was found that there are many factors that affect the amount of microplastics in shellfish, such as microplastic contamination in the marine environment, both in water and soil, etc. However, there is not much information on microplastic contamination in shellfish. Therefore, it is necessary to explore the situation of microplastic contamination of shellfish. This is an important aspect of consumers' exposure to microplastics.

This research therefore studied microplastic contamination, including the amount, size, shape, and color of microplastics in coastal soil around the cages, seawater, and in the digestive tract. Part of the draft and the water inside the shell of the White-jawed oyster. which has different levels of depth in raising from oyster cages at Ban Tha Ruea, Wang Won Subdistrict, Kantang District, Trang Province.

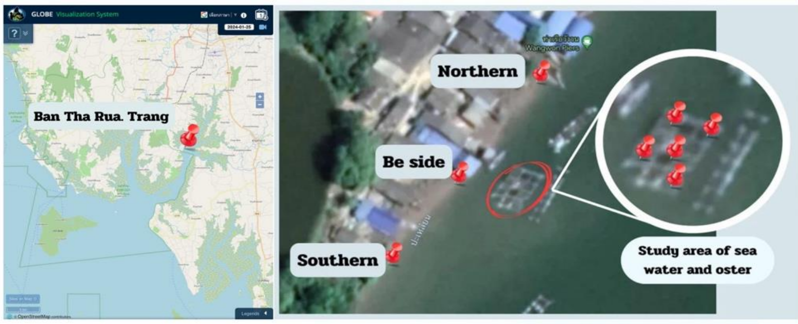
Materials

1. Nitrite test kits
2. Dissection Kits - Small Set
3. Filter cloth sizes 300 and 20 micrometers
4. Vacuum pump
5. Glass microfiber filter GF/C
6. Nansen Bottle size 100 ml.
7. N P K test kits
8. Stereo microscope
9. Hot air oven
10. pH meter
11. DO meter
12. refractometers
13. Transparency Tube
14. Ferrous Sulphate ($FeSO_4$) 0.05 M
15. Hydrogen peroxide (H_2O_2) 30%
16. Potassium Hydrocarbon (KOH) 1%

Research Methods

1. Define the study area

This study was carried out in the microplastic-affected river mouth area of Ban Tha Rua, Kantang District, Trang Province, which is located at latitude (7.3637) and longitude (99.5704). (Figure 1)



In Ban Tha Rua, Kantang District, Trang Province, oysters are raised by cutting rubber rings from old motorbike wheels in half and fastening them with rope. After that, it is submerged in seawater to act as a surface for the oysters to stick to. (Figure 2)

Figure 2 : How to grow oysters

2. Collecting samples

2.1 Collecting soil samples.

1) The northern, side, and southern portions of the oyster farming region are the study areas. Using a methodical drilling technique, choose sampling points at random, with three points per research area. (Figure 3)

2) Use a planting spoon at approximately 10 cm depth from the soil surface. Place the collected samples in sample bags, totaling 2,000 grams per sampling point.

3) Enter data about the research area into the GLOBE Land Cover system.

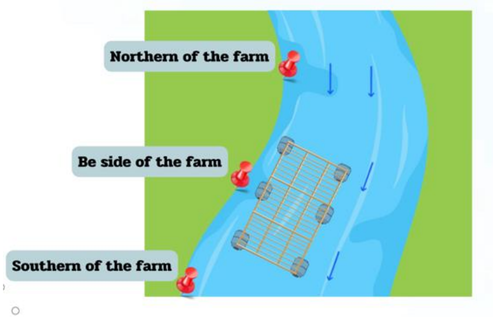


Figure 3 : How to define the point for collecting soil samples.

2.2 Collecting water samples.

1) Designate sampling points using a systematic drilling method, dividing them into 5 study points shaped like the letter Z around the oyster farm - 4 points at the corners and 1 set in the center.

2) Using water sampling bottles, gather water samples at two depth levels: 0.55 meters, which is the water surface region, and 1.20 meters, which is the deep water area. Each sample have a volume of 3,000 milliliters.

2.3 Collecting oyster samples.

1) Designate sampling points by random selection, dividing the collection area into 5 study points (same as water sampling). Collect samples at 2 depth levels (0.55 meters and 1.20 meters). (Figure 4)

2) Place oyster samples in containers, collecting 12 samples per study point, with 6 from water surface area and 6 from deep water (totaling 60 samples).

3) Store samples at -20 degrees.

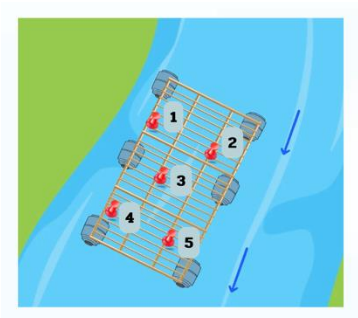


Figure 4 : How to define the point for collecting oyster and water. samples.

3. Check quality

3.1 Check soil quality

Assess soil quality using the GLOBE method by taking measurements of pH, organic matter content, and major soil nutrients. This is the procedure.

1) In a hot air oven, remove moisture from a sample of soil by baking it. After a day of maintaining a temperature between 95 and 105 degrees Celsius, strain the mixture over a 5 mm sieve.

2) Take the soil sample that has been sieved. Let's check for the main nutrients in the soil (Nitrogen, Phosphorus, Potassium) using the following method:

2.1) Pour 20 grams of soil sample into a beaker then Add distilled water and mix with soil in a 1:1 ratio.

2.2) Use a glass stirrer to stir the soil sample for 30 seconds, then set aside for 3 minutes. Repeat 5 times.

2.3) After 5 times, leave the soil until it settles. and see clear water in the upper area.

2.4) Aspirate the clear water with a volume of

2.5) Milliliters per 1 set of experiments to enter the process of detecting the main nutrient values with the Soil Primary Nutrient Testing Kit (NPK).

3) Take the soil sample that through sieving Let's check the acidity - base level in the soil (pH) using the following method:

3.1) Prepare a soil sample solution. Follow steps 2.1, 2.2 and 2.3 in the process of detecting the main nutrients in the soil.

3.2) Dip the pH paper into the clear area of the soil sample solution. Observe and record results.

4) Take a soil sample that has been sieved. Let's check the amount of organic matter in the soil by the following method.

4.1) Pour 30 grams of soil sample into a cup for burning soil.

4.2) Burn the soil sample at 450 degrees Celsius for 6 hours.

4.3) Weigh the soil sample after burning. Then analyze the amount of organic matter in the soil.

5) Record the obtained soil quality data into GLOBE Data Entry.

3.2 Check quality

Using the GLOBE method, determine the water quality by measuring the salinity, pH, dissolved oxygen, electrical conductivity, and nitrite. and turbidity in this way:

1) Use a 5 mm sieve to filter a 1,000 ml sample of water.

2) To determine the water's turbidity, take a sample. By filling the Transparency Tube with a water sample until the black and white stripes beneath it are completely hidden, then cease adding water. and check the pipe's side turbidity value.

3) Take a water sample to study the acidity - baseness of the water (pH) with pH paper according to the following method:

3.1) Swish the container with the sample water 2 times and add 20 milliliters of sample water to the container.

3.2) Dip the pH paper to measure the pH of the water. example Then compare the color of the pH measuring paper with the color strip attached to it. Comes with pH measuring paper used for measurement.

4) Take a water sample to study the Dissolved Oxygen value of the water with a DO meter by swinging the probe in the water sample until the Dissolved Oxygen value displayed on the machine remains steady.

5) Use a salinity meter and an electrical conductivity meter, respectively, to analyze water samples for salinity and electrical conductivity.

(6) Use a Nitrite Test kit to collect water samples and analyze their nitrite content.

(7) Type the data on soil quality that you collected into GLOBE Data Entry.

4. Check Microplastic

4.1 Check Microplastic in soil

1) Take a sample of dirt and bake it for 24 hours at 60 degrees.

2) After the soil sample has been roasted to eliminate moisture, weigh 300 grams and strain it through a sieve with eyes that are 5 mm and 1 mm in diameter. For counting, sieves with eye diameters of 1 mm and 5 mm were employed. Take photos and note the outcomes.

3) After being filtered via a 1 mm sieve, soil samples are put in a 1000 ml. beaker together with the necessary amount of saline. (For instance, add 600 ml of saline if there are 300 ml of dirt. The substance can be stirred with a glass stirring rod. After that, give it five minutes or so to settle.

4) Upon observing that the water has become more transparent. Using a 300-micrometer filter cloth, pour water through it. Continue for three to five cycles until nothing is seen floating on the water's surface. Then rinse the soil sample that was adhered to the 300-micrometer filter cloth in distilled water into a 500-milliliter beaker.

5) After filtering the material through a 300-micrometer filter cloth with a 20-micrometer filter cloth, rinse the soil sample with distilled water. It was put into a 500 ml beaker along with a 20-micron filter cloth.

6) Transfer the samples from each 500 ml beaker into the WPO process by mixing in 20 ml of hydrogen and ferrous sulfate solutions. 20 milliliters of peroxide were allowed to react at room temperature for five minutes.

7) After that, set the beaker on a stirrer and heat it, being careful to keep the temperature from rising above 75 degrees Celsius. Place the sample in a fume hood and inject distilled water if there are a lot of gas bubbles. until the gas bubbles disappear Next, gradually add 20 milliliters of hydrogen peroxide solution while making sure the temperature stays below 75 degrees Celsius. Continue observing the sample and repeating the process until the temperature stays constant or the solution does not respond.

8) To each 20 ml of sample solution, add 6 grams of sodium chloride. Raise the heat to 75 degrees Celsius, or until the sodium chloride dissolves entirely.

9) Fill the container with the solution. to remove heavy silt and mist the sample to keep it from staying in the container. After that, place foil over the container and let it sit for a full day.

10) Place the sample onto a filter cloth with a 300-micrometer opening. After transferring the sample to a 300-micrometer filter cloth, bake it for about three hours at 60 degrees Celsius, or until it is dry.

11) Move the sample into a beaker while it's still linked to the 20 microns filter cloth. Next, line a baking sheet with GF/C paper and bake at 60 degrees Celsius for about 3 hours, or until it is completely dry.

12) Take the dried sample and examine it under a stereo microscope. Next, note the amount as well as the image, form, color, and appearance.

4.2 Check microplastic in water

1) Gather samples of water. Let's apply the same filtering method as the second study step. soil with microplastics

2) Use a 300 micrometer filter cloth to filter a material that has been through a 1 mm diameter sieve. Next, mist a 500 ml beaker with the sample that is linked to the filter cloth.

3) Take the sample that's been through a cotton filter with a 300 micrometer opening. Proceed as in step 2 after filtering at 300 micrometers using a 20 micrometer filter cloth.

4) Apply the acquired sample to the investigation of microplastics in soil by following steps no. 6, 7, 8, 9, 10, 11, and 12.

4.3 Check microplastic in oyster

1) After removing the oyster meat from the shell, split it into two sections: the body parts and the digestive tract. By dissecting and observing the structure of the Gill Adductor muscle and Labial palp, the sediment stuck inside the shells was injected into beakers (total of 30 experimental sets).

2) Weighing was done on the divided shellfish samples. through individual weighting into groups for experiments.

3) Gather samples that are prepared for examination. Using scissors, cut it into little pieces. Place it in a 500 ml beaker. Set up a different experiment set up for shellfish meat and water inside the shells for WPO.

4) Fill the full beaker with 180% of the 30% hydrogen peroxide and 20 ml. of the 1% potassium hydroxide (ratio 9:1).

5) Include a magnetic stir bar and continue to stir until all of the sediment or tissue has been broken down. To mix the material, you can use a glass rod. beyond However,

you also need to rinse the glass stirrer into the beaker with distilled water. Keep your mouth shut with foil while performing the exercise.

6) After everything is finished, add 6 grams of salt to 20 milliliters of solution, swirl to dissolve, and then transfer to a tall cylinder to be left overnight. Use distilled water to mist the sediment out of the beaker as you transfer the sample.

7) Following your departure from it Remove the sample and place it in a 20 micron filter cloth after one night. Make sure to mist the measuring cylinder with distilled water as you remove the sample. Subsequently, place it in a petri dish and allow it to air dry using a 20 millimeter filter cloth.

8) Bake the sample for roughly three hours at 60 degrees Celsius.

9) Take a look at the dried sample with a stereo microscope. Take note of the quantity, shape, color, and image.

10) Dry the sample for around three hours at 60 degrees Celsius.

11) Take a look at the dried sample with a stereo microscope. Next, capture the picture. Form, hue, and amount

5. analyze data

1. Examine the amount of microplastics in the soil, the quality of the water,and the soil itself. The amount of microplastics in the gastrointestinal system the contents of an oyster's shell, including its watery interior. and the quantity of microplastics present in water at various depths. utilizing the standard deviation and mean.

2. Use the ANOVA and t-test to compare the soil quality in each research area: Two-Sample with Equal Variances Assumed.

3. Use the t-test and ANOVA to compare the water quality at various depths: Assuming Equal Variances in a Two-Sample

4. Use Two-way ANOVA to compare the quantity, color, and form of microplastics in the soil in each research location.

5. Use Two-way ANOVA to compare the quantity, size, color, and form of microplastics in water at the breaking depth.

6. Examine the amount, dimensions, hue, and form of microplastics in the gastrointestinal system. Using two-way ANOVA, body components and the water inside oyster shells were analyzed.

Result

1. Soil quality

A study of the soil quality in the northern, side and southern areas of the farm found that the pH value of the main nutrients in the soil. There is not statistically significant. As for the value of organic matter in the soil have statistically significant were found as shown in Figure 5, 6 and 7.

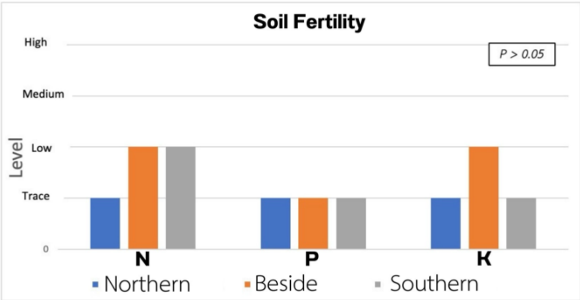


Figure 5 : soil fertility level chart

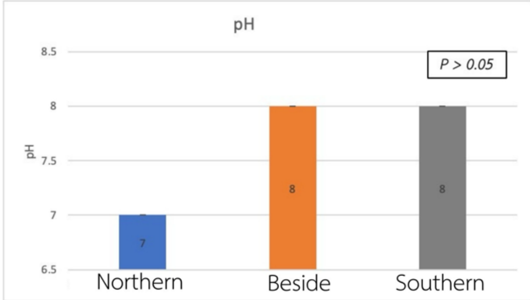


Figure 6 : pH level chart

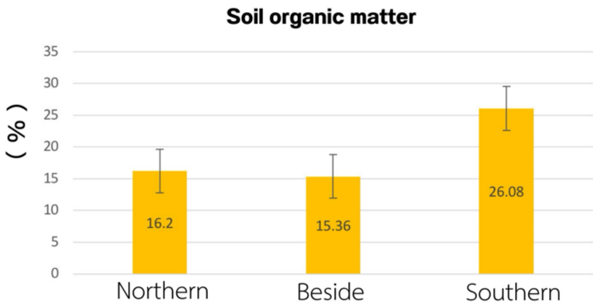


Figure 7 : The amount of Soil organic metter chart

The soil quality in the north, sides, and south of the cages: The average pH was 7.67±0.47, the sides and south had low nitrogen abundance, the northern part was trace, all phosphorus values were trace, and both the north and south had low potassium values. Both values are not statistical significant, but the amount of organic matter statistical significant, with the northern, side, and southern sides having values of 16.20%, 15.36%, and 26.08%, respectively.

2. Water quality

From a study of the water quality, it was found that the pH, DO, nitrite and electrical conductivity values There was no difference, and it was found that the turbidity and salinity values were different as shown in Figures 8 – 13.

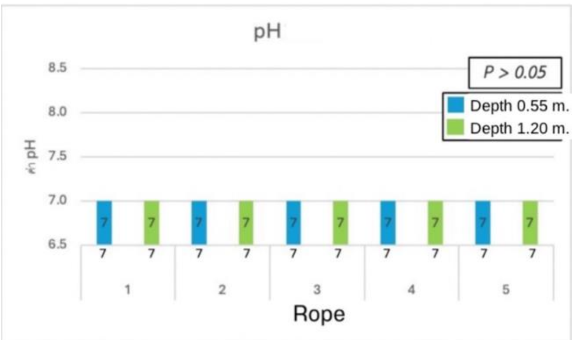


Figure 8 : water pH level chart

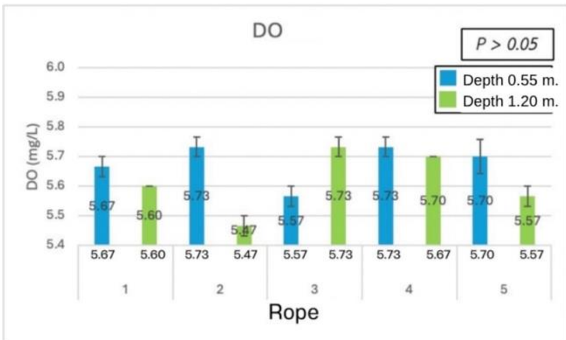


Figure 9 : water DO level chart

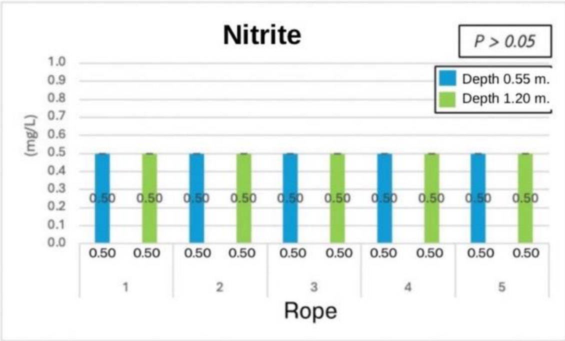


Figure 10 : The amount of Nitrite in water chart

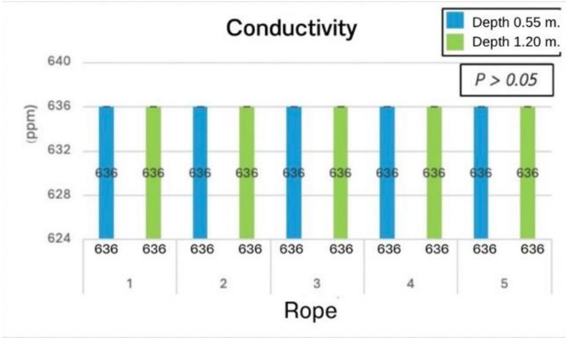


Figure 11 : Conductivity in water chart

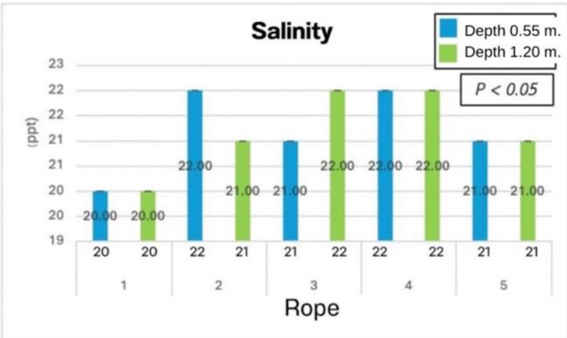


Figure 12 : Salinity level in water chart

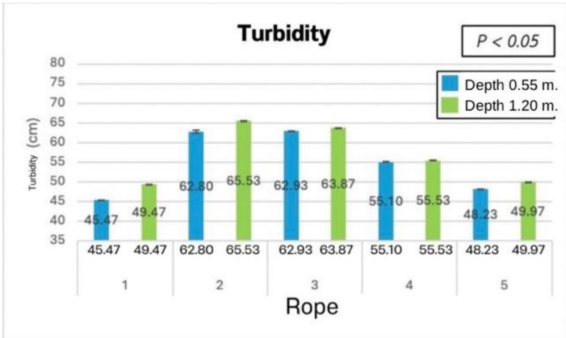


Figure 13 : Turbidity level in water chart

The water quality of the water at every point found that the pH value was 7 in every test set. The nitrite value was 0.5 mg/L in every test set. The electrical conductivity was 636 in every test set. The average DO value was 5.65±0.09 mg/L, which all 4 values did not have differences in statistical significance While the turbidity and salinity values had a statistically significant difference, the turbidity value was 55.89±7.06 cm and the average salinity value was 21.20±0.74 ppt.

3. Check microplastic in soil

A research examining the quantity of microplastics in coastal soil discovered that the majority of the plastic was greater than 5 mm, indicating that it was not microplastic. Additionally, 5 mm–1 mm microplastics are the most prevalent type. The majority of microplastics are found in side areas. It was the most abundant source of blue and fiber microplastics.

Table 1 : The amount of plastic in the soil table

Study area	Amount of microplastics per 100 grams of soil (pieces)				
	> 5 mm.	1-5 mm.	300 µm. - 1 mm.	20 - 300 µm.	Aggregate
Northern	26.33 ± 0.88	22.33 ± 2.33	19.00 ± 1.73	5.00 ± 0.58	76.00 ± 2.68
Be side	35.00 ± 1.00	23.00 ± 2.08	20.33 ± 2.91	6.67 ± 0.88	84.67 ± 3.14
Southern	30.33 ± 1.45	25.00 ± 2.52	14.33 ± 0.88	6.33 ± 1.45	76.00 ± 2.90

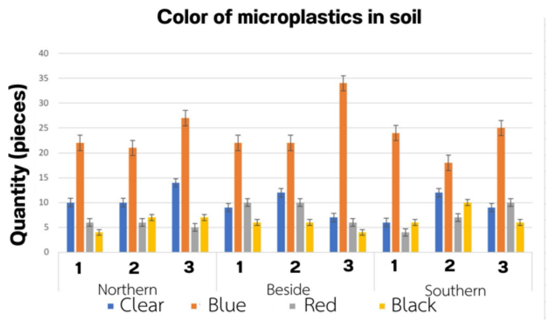


Figure 14 : Color of microplastics in soil chart

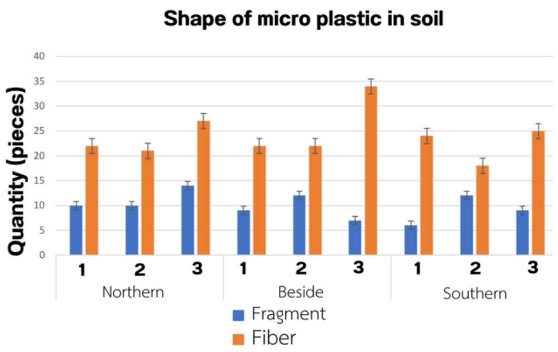


Figure 15 : Shape of microplastics in soil chart

4. Check microplastic in water

In surface water at a depth of 0.55 meters, there were more microplastics than in water at a depth of 1.20 meters, according to a study on microplastics in water. The majority of microplastics were discovered to be blue and fiber, with diameters ranging from 1 mm to 300 µm.

Table 2 : The shape and color of microplastics in soil chart

Depth level (m)	Amount of microplastics per 300 ml. of water (pieces)		
	300 µm. - 1 mm.	20 - 300 µm.	Aggregate
0.55	13.80 ± 1.17	5.80 ± 0.75	19.60 ± 3.27
1.20	7.60 ± 1.36	3.40 ± 1.85	11.00 ± 1.71

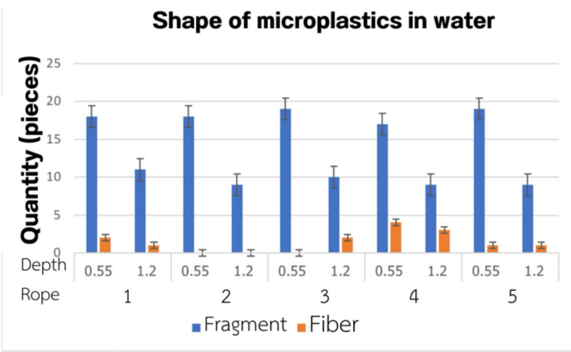


Figure 16 : Shape of microplastics in water chart

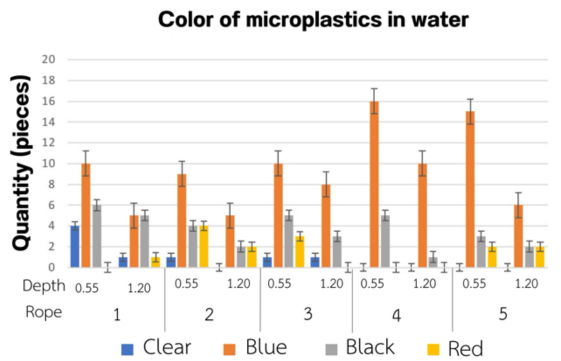


Figure 17 : Color of microplastics in water chart

5. Check microplastic in oyster

The majority of microplastics are detected in the water inside shells, body parts, and parts of the digestive tract, respectively. More microplastics were found in oysters raised at the surface, according to a study on microplastics in oysters. The majority of microplastics were discovered to be blue and fiber.

Table 3 : The shape and color of microplastics in oyster chart

Depth level (m)	Parts of oyster	Amount of microplastics per 300 ml. of water (pieces)		
		300 µm. - 1 mm.	20 - 300 µm.	Aggregate
0.55	Digestive tract	5.80 ± 0.75	3.00 ± 0.63	8.80 ± 1.14
	Body	7.80 ± 1.17	4.40 ± 0.49	12.20 ± 3.89
	Water in oyster	14.40 ± 3.07	8.40 ± 0.49	22.80 ± 2.45
1.20	Digestive tract	3.40 ± 1.02	2.60 ± 1.02	6.00 ± 0.32
	Body	5.00 ± 1.41	3.00 ± 1.10	8.00 ± 0.81
	Water in oyster	7.80 ± 1.72	3.00 ± 0.89	10.80 ± 1.96

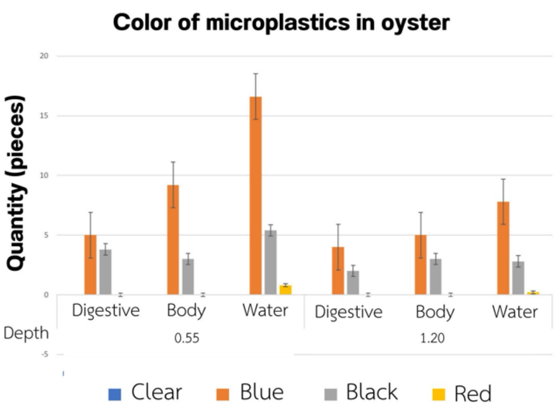


Figure 18 : Shape of microplastics in water chart

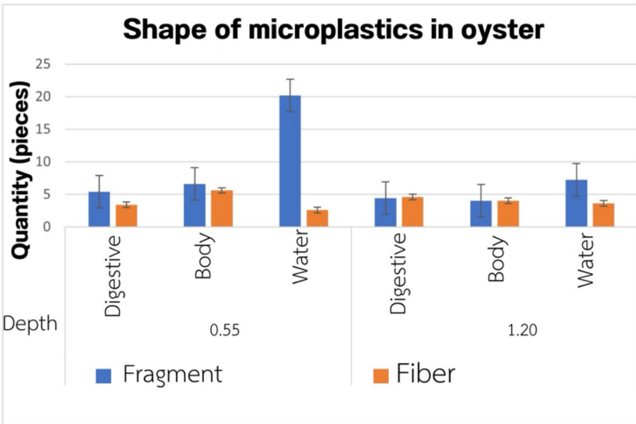


Figure 19 : Shape of microplastics in water chart

Discussion

The amount of plastic in the soil in each area was slightly different and found to be large pieces of plastic that may have come from community garbage or fishing equipment. The amount of microplastics in the water and oysters followed the same trend. More microplastics were found in the water surface area of 0.55m than in the water depth of 1.20m because microplastics are lightweight and small in size, and the water in the cultivation area is brackish water that is denser than normal water. This makes it possible to find more microplastics at the surface of the water than in deep water (Khon Kean Agriculture Journal Suppl. 1: 2021) and more microplastics are found in the water inside the shells. body parts and the digestive tract of oysters, respectively, because more microplastics in the water can remain inside the shells. There is contamination in oysters through eating filtered through the gills, which has a high chance of microplastic residue (Ponnapa Saelee et al. 2021). As a result, more microplastics were found in the body parts than in the trail parts. Walking food Most microplastics were found in the form of blue, black, and clear fibers, which are the colors that come from the plastic of the equipment. All fishing and it could come from plastic waste from community.

Conclusion

The soil quality around the farm is rarely found to be different. However, the organic matter in the soil was different as a result of the sample collection area. The soil under the farm had a higher amount of organic matter because it was close to the mangrove forest, unlike the area above and beside the farm where there are ports and houses.

Quality of seawater in areas where oysters are grown Found only differences between Turbidity and Salinity The turbidity is a result of the number of oysters whose shells have accumulated sediment causing different turbidity. Still in the range of 20-22 ppt, which is the normal salinity of brackish water.

Microplastics the soil, larger plastics than microplastics were found, which may have come from garbage or fishing equipment in the community. The highest amount of microplastics was found in the area flanking the farm. The majority of microplastics were discovered to be blue and fiber.

Microplastics in water, the amount of microplastics on the surface of the water was higher than in deep water, at 4.3 ± 1.45 pieces per 300ml of water. The majority of microplastics were discovered to be blue and fiber.

Microplastics in oysters, the amount of microplastics in oysters grown in surface water was higher than in deep water, 19.8 ± 2.41 pieces per 6 oysters, with more found in the water inside the shells. body parts and parts of the digestive tract, respectively The majority of microplastics were discovered to be blue and fiber.

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Citation

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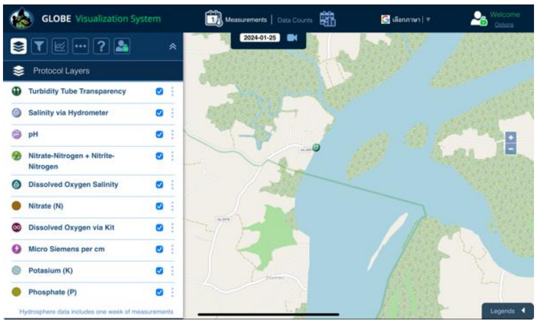
GLOBE Data Entry



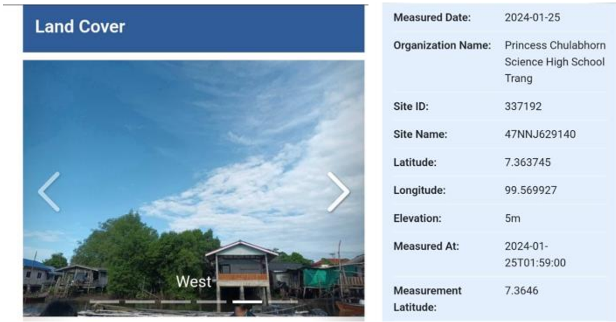


Figure 20 : Entering water quality into GLOBE Data Entry

Figure 21 : Record data into GLOBE Land cover

Optional Badge

1. I AM COLLABORATION

Our collaboration plan and the field visit, we have a well-defined and organized division of work. Additionally ,where Thagool will gather oyster samples, Yutiwit is a collector of soil and water samples who has received assistance from fellow students in gathering water samples. Additionally, We have given other students experience in field trips and data collection. Also present during the visit was Neungruthai, who was available to offer guidance. and the operations of the proprietor of the oyster farm, who grants access and promotes visits. Thagool would later conduct research and experiments on microplastics in water and soil. Yutiwit will conduct experiments and research on microplastics in oysters, water quality, and soil quality. After that, the microplastics in the soil, water, and oysters were discussed and concluded together as a whole. with Thagool making media appearances and Yutwit writing the report Ultimately, with methodical cooperation and support from a variety of sources, we managed to produce a video together. This makes it possible to lessen and streamline the significant workload associated with microplastic research.

2. I MAKE AN IMPACT

Because microplastics may scatter and absorb sunlight, their pollution of the environment has an adverse effect on ecosystems and contributes to global warming. The trend of microplastics is expected to rise in tandem with an increase in global warming. due to UV rays and heat It contributes to the disintegration of plastic into microplastics. Microplastic pollution has been discovered in a wide range of organisms, including shrimp, fish, and clam. Because individuals frequently consume raw oysters and freshness, without going through a clean. It becomes a source of leftover microplastics as a result. We are interested in researching the presence of microplastic contamination in oysters. The digestive system of oysters can get ulcerated due to microplastics. lowering the rate of shellfish growth. and during oyster consumption, Microplastics tainted with contaminants may serve as intermediaries in the body's absorption of heavy metals or other substances. Microplastics, on the other hand, persist in the body and have the potential to cause wounds or blood vessel blockages. Our study demonstrates the widespread presence of microplastics and increases public awareness of the use of plastics and the problem of plastic waste. We find growing water in deep water where oysters can still grow is one method of reducing the buildup of microplastics. Microplastics are abundant at the water's surface because microplastics are small and light. Another method to lessen microplastics is to grow them in deeper water.

3. I AM DATA SCIENCE

To monitor data fluctuation and enhance data precision As a result, statistical analysis was done as the study was being conducted. We also took into account and aggregated data from research on microplastic contamination of food. In the ocean as well as in oysters Trends in microplastics The effects of microplastics including researching data collection techniques, experimental techniques, and sample collection techniques. To get experimental results that are as rational and in line with reality as possible—both historically and currently—including using research data-derived theories and principles to explain and characterize the experimental findings.