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

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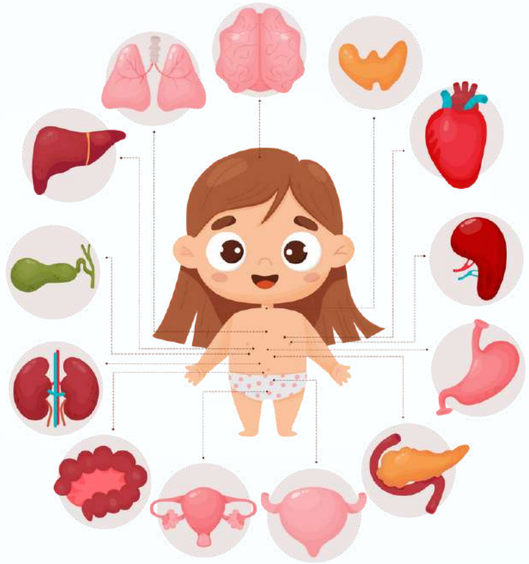
Introduction

Crassostrea belcheri

Micro plastic



The human body

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. White-jawed oysters raised in cages. 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. 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.

Equipment

1. N P K test kit

2. Water quality test kit

3. Beaker

4. Hotplate

5. Vacuum pump

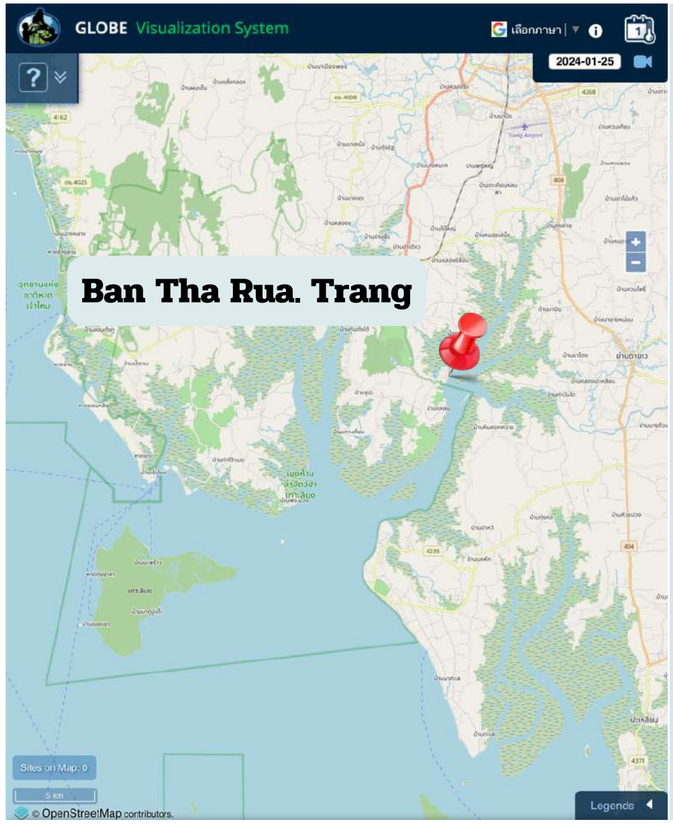
6.Small surgical instrument set

7. Stereo microscope

8. Hot air oven

Method

Define the study area



Method

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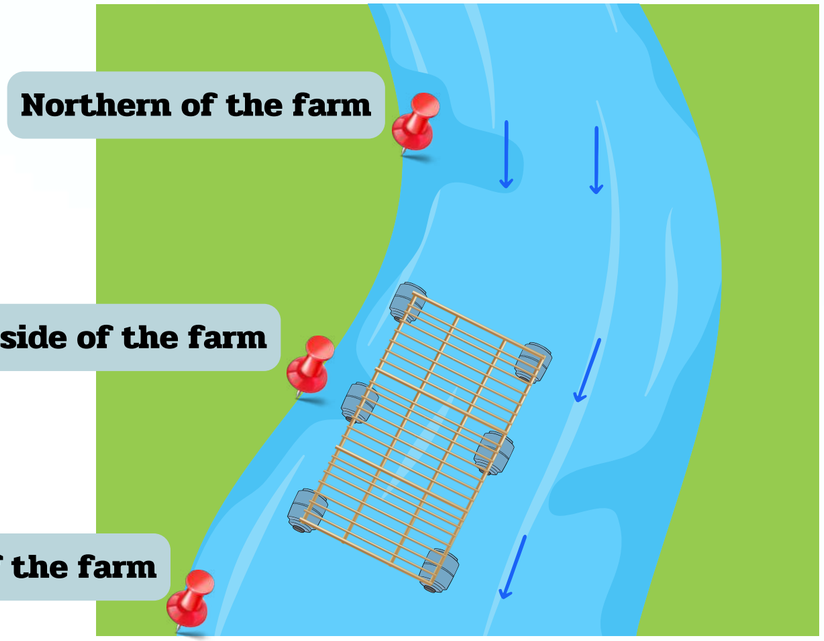
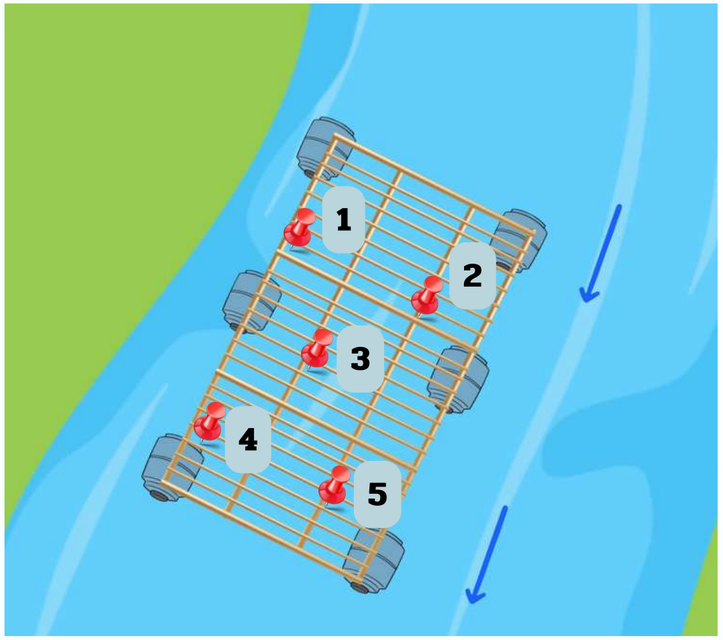


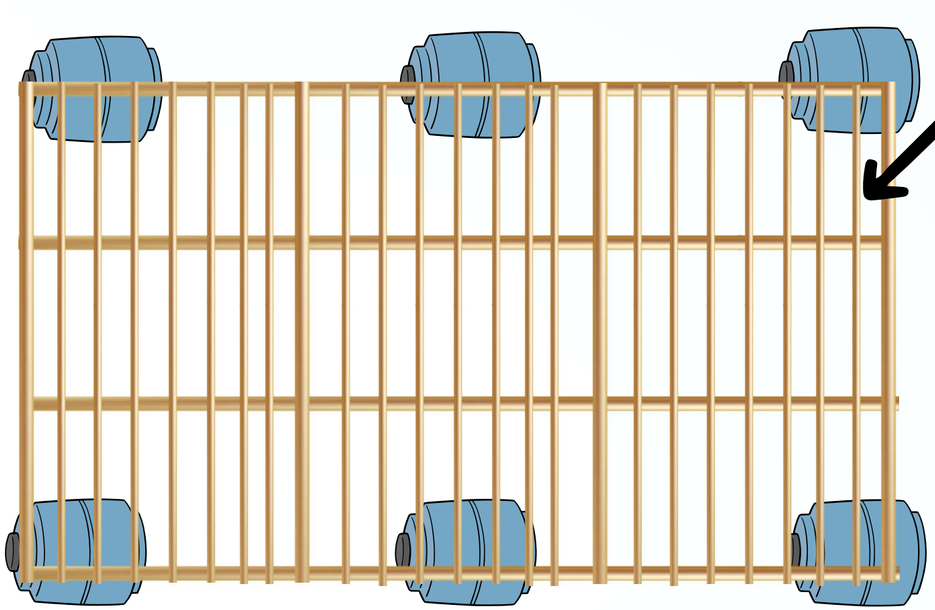
Define the point for collecting soil samples.



Define the point for collecting oyster and water samples.

Method

How to grow oysters



0.55 m.

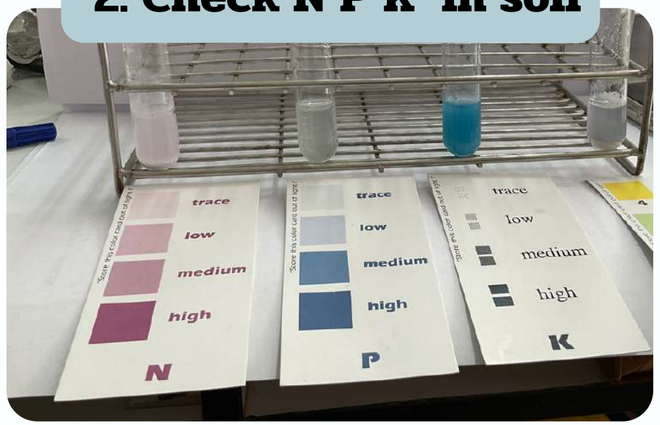
1.20 m.

Method

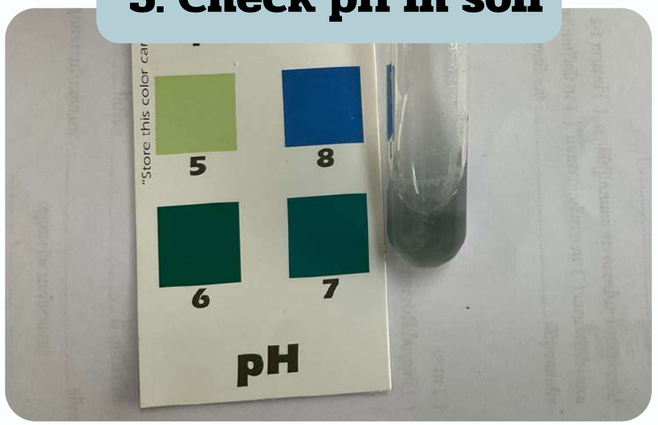
Check soil quality

1. Bake and sift the soil

2. Check N P K in soil

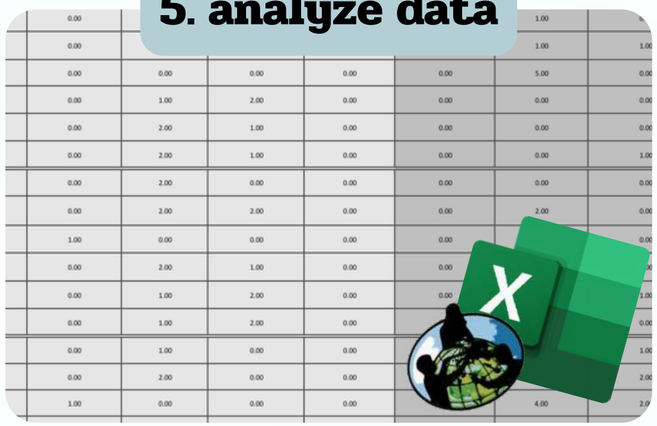


3. Check pH in soil



4. Check amount of organic

5. analyze data



Method

Check water quality

1. Sift the water

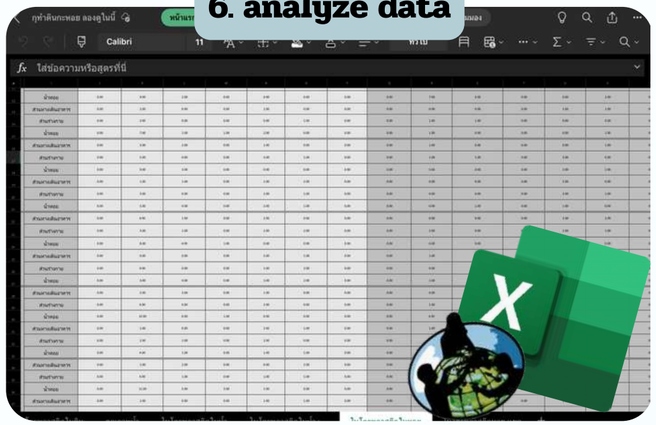
2. Check pH, DO

3. Check Transparency

4. Check Salinity, Conductivity

5. Check Nitrite

6. analyze data



Method

Check Micro plastic in soil

1. Bake the soil

2. sift the soil

3. Bringing soil into the WPO

4. Filter the soil with GF/C.

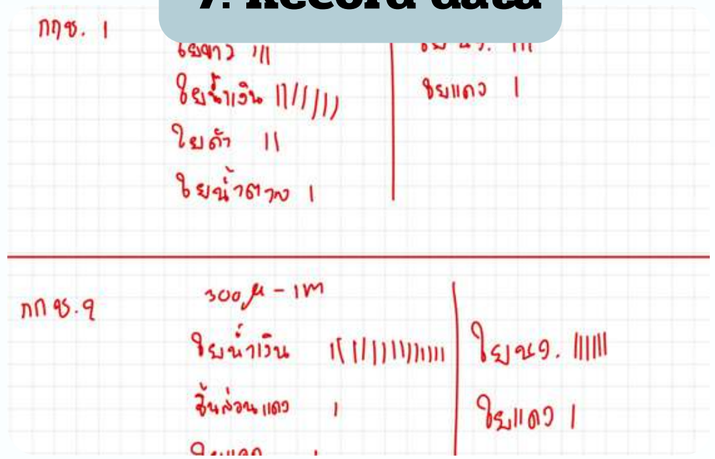
5. Bake the sample on GF/C.

Method

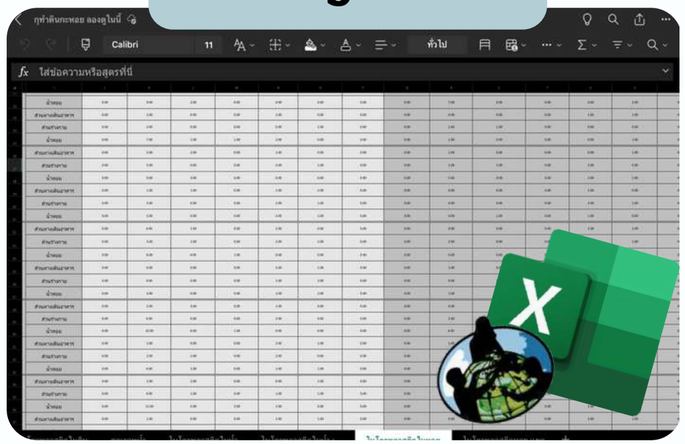
Check Micro plastic in soil

6. Inspect Microplastic

7. Record data



8. analyze data

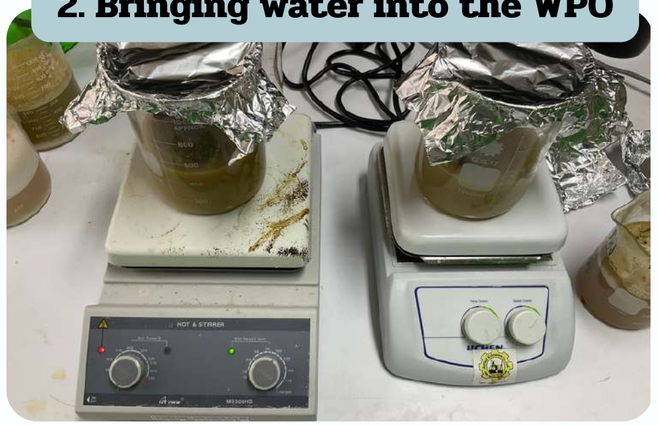


Method

Check Micro plastic in sea water

1. sift the water

2. Bringing water into the WPO



3. Filter the water with GF/C.

4. Bake the sample on GF/C.

5. Inspect Microplastic

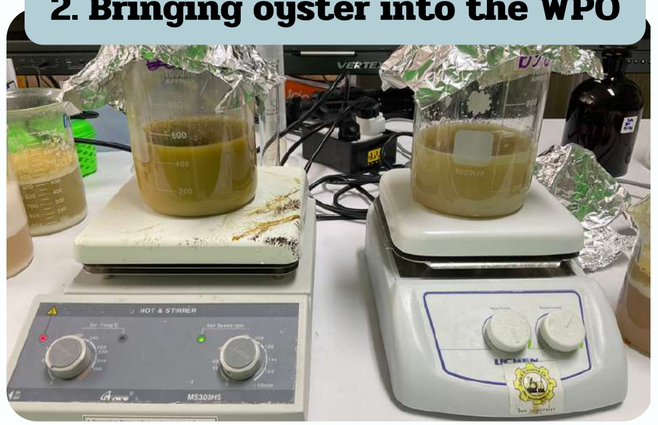
6. analyze data

Method

Check Micro plastic in oyster

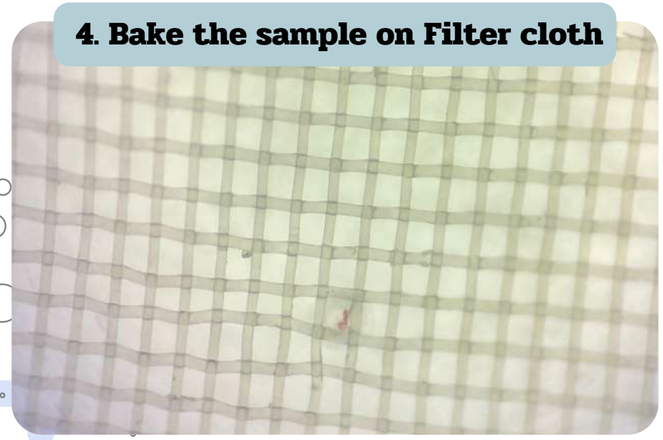
1. separate oyster parts

2. Bringing oyster into the WPO



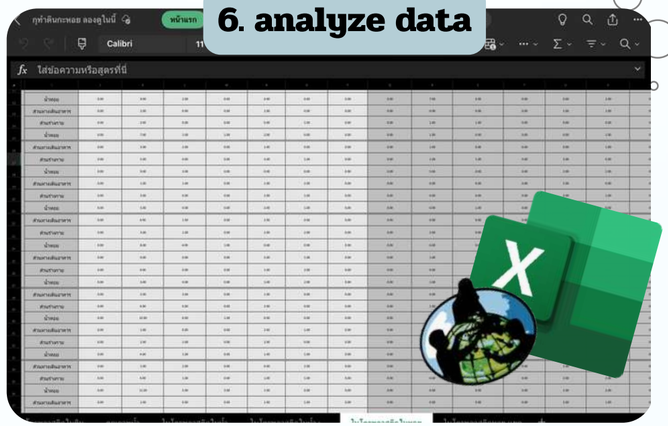
3. Sample filte

4. Bake the sample on Filter cloth



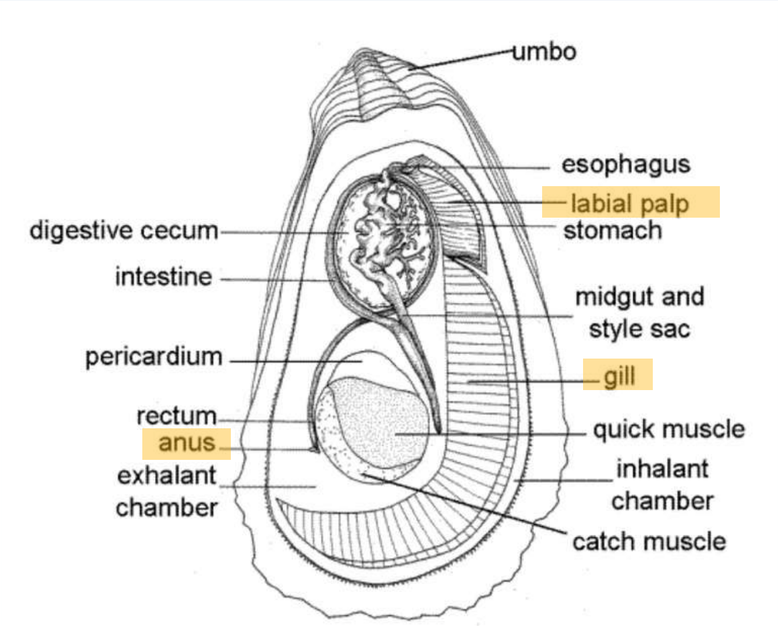
5. Inspect Microplastic

6. analyze data



Method

Oyster separation surgery



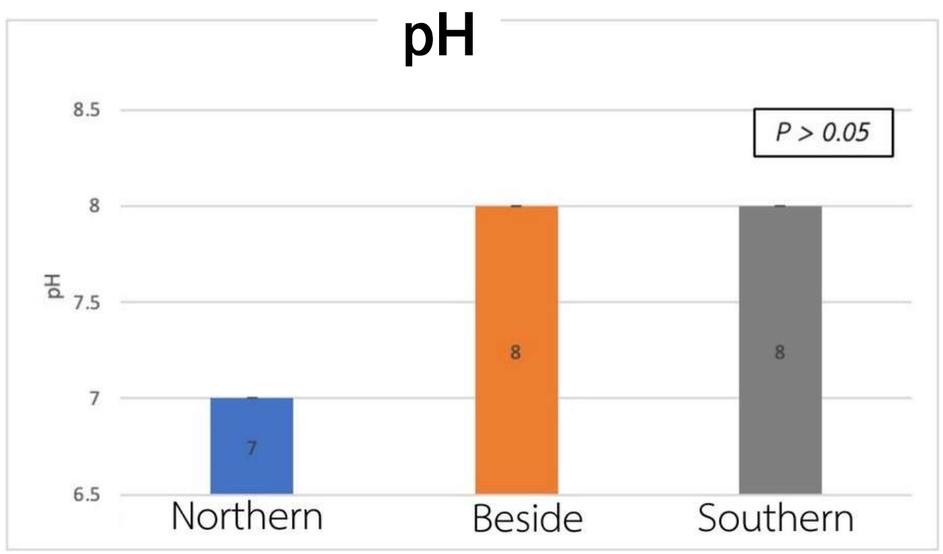
Reference :Richard Fox Lander University, 2005

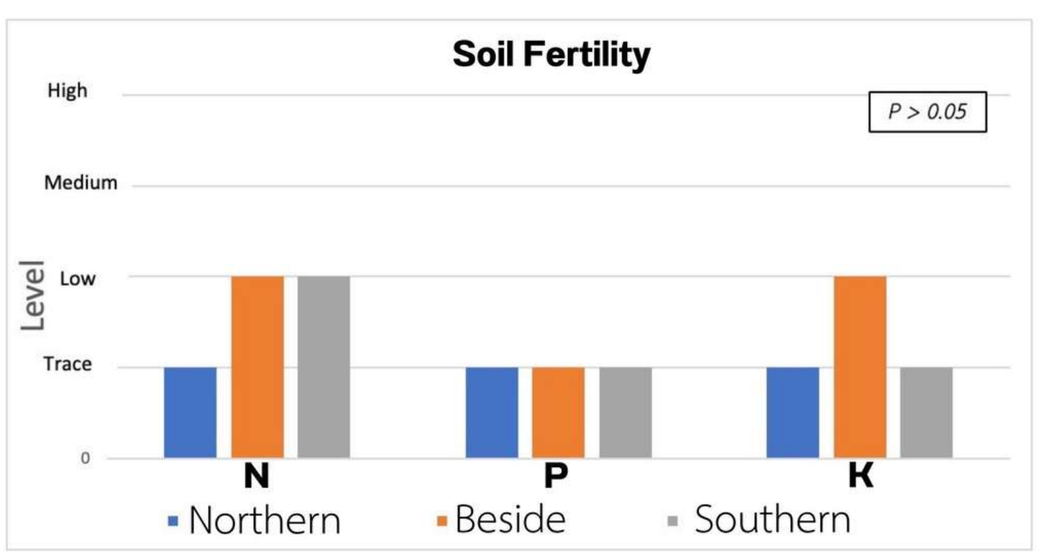
Divide into 2 parts by finding the Adductors muscle, with one side being the gums and anus. After that, level the gums up until meeting the labial palp and cut them apart using (gill) and labial palp

- Digestive tract part
- Body part
- Water

Results

Soil quality chart





Results

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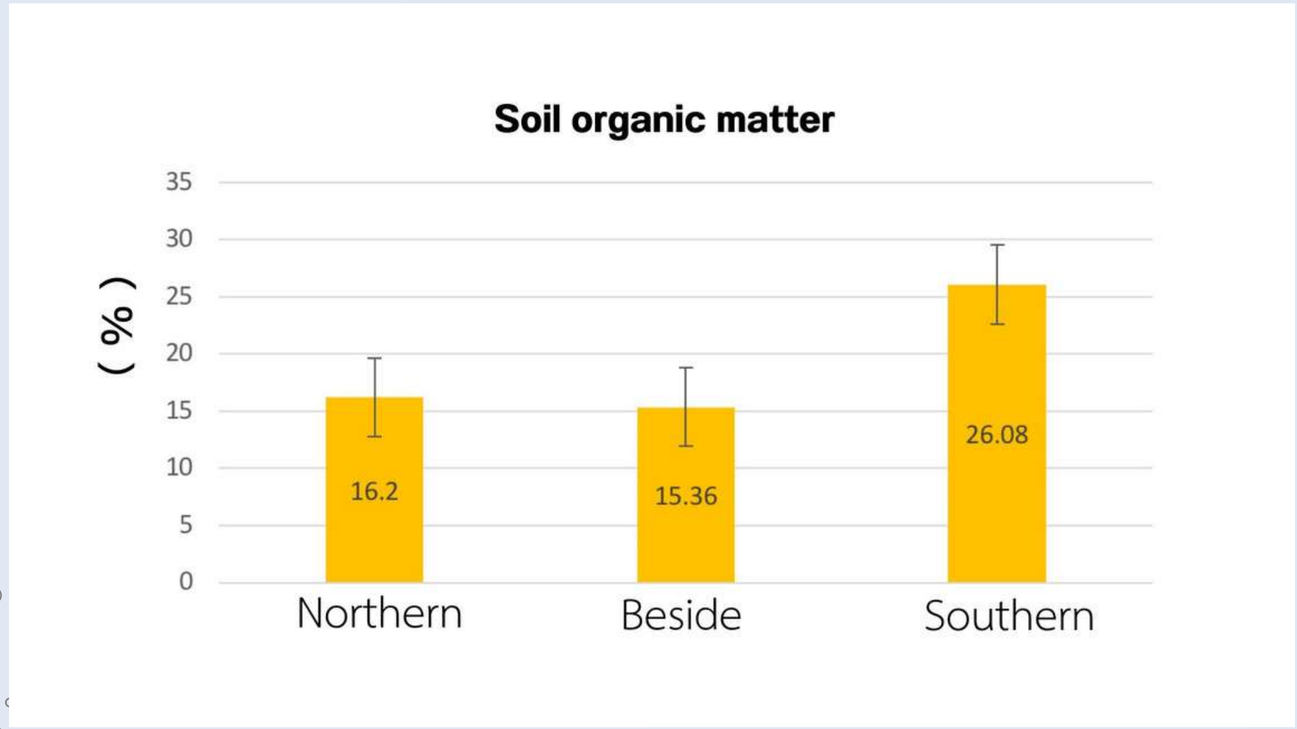


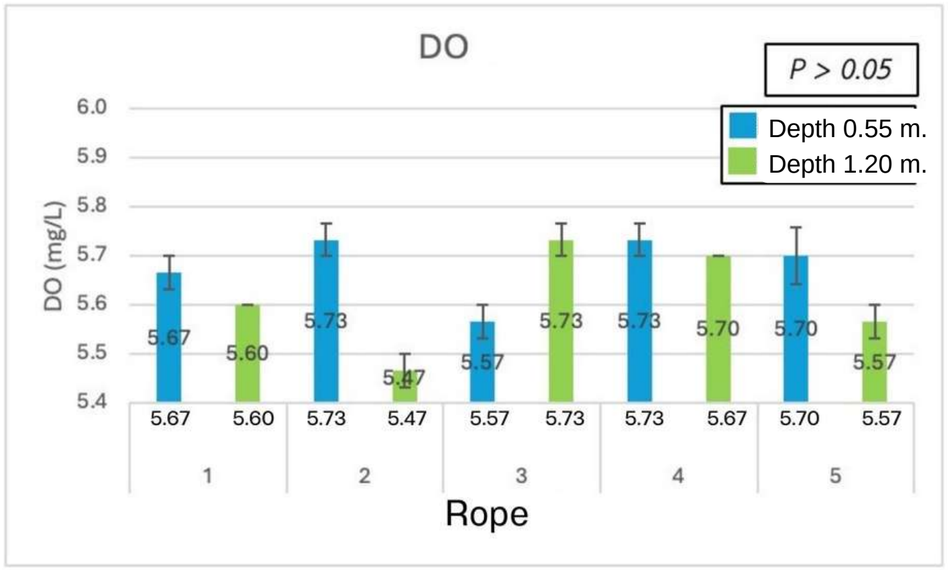
Northern : port environment

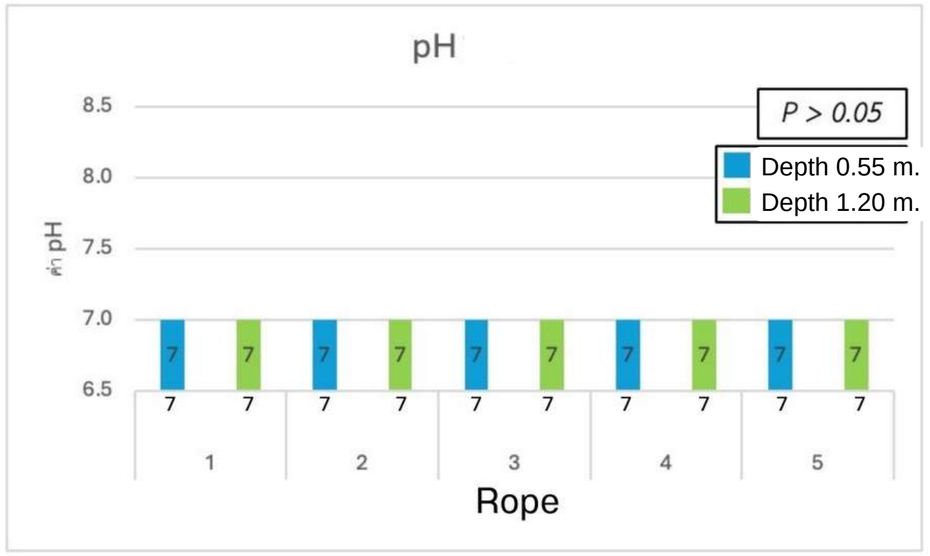
Beside : house environment

Southern : mangrove forest

Results

Water quality chart





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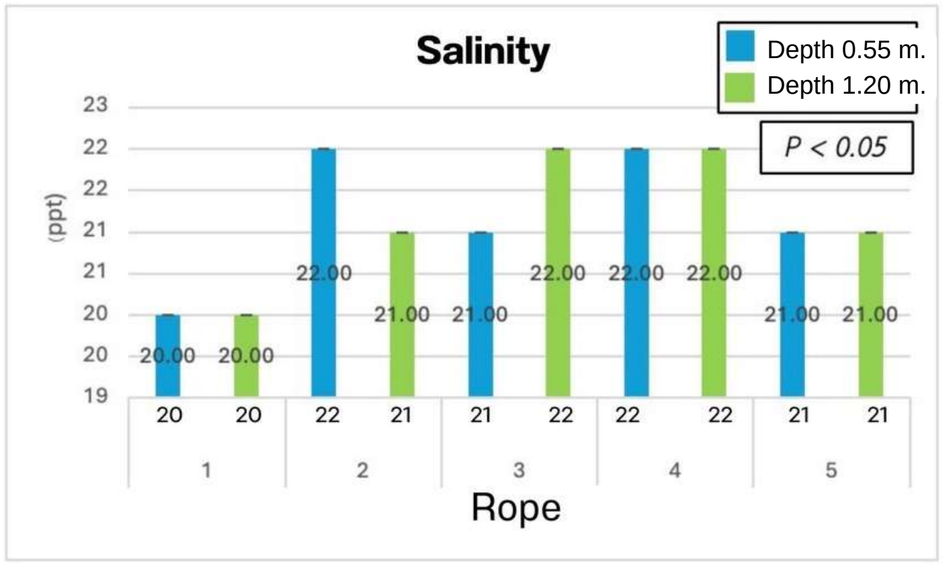
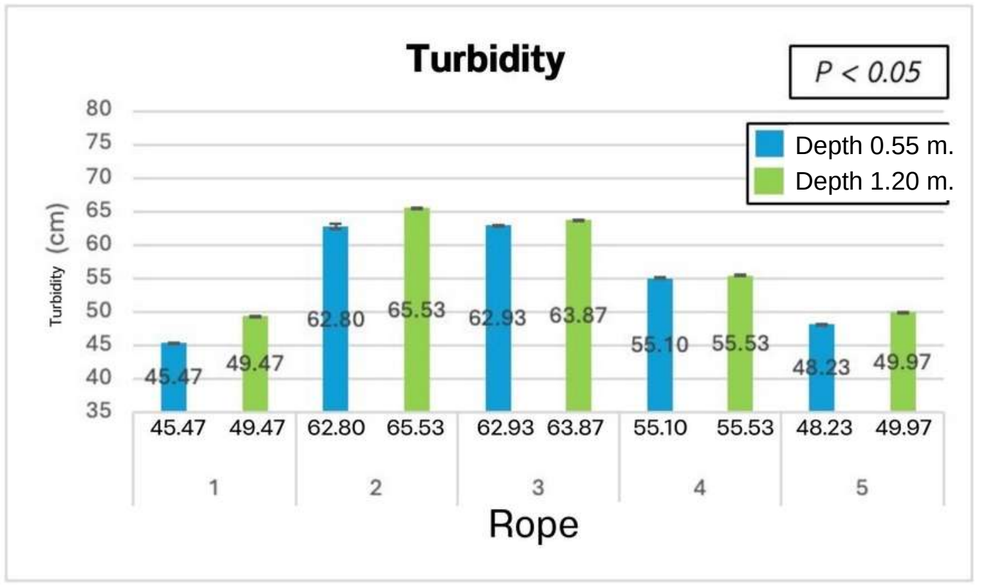
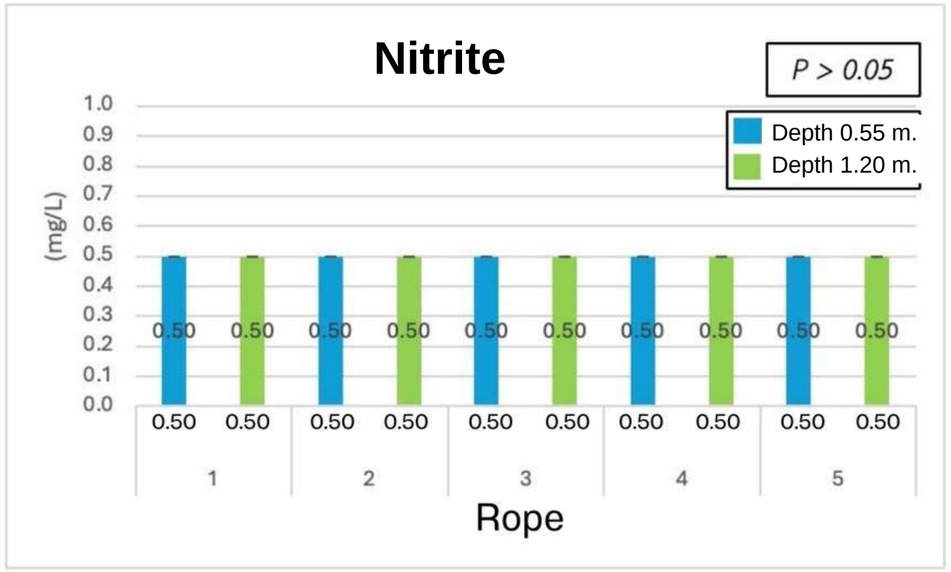
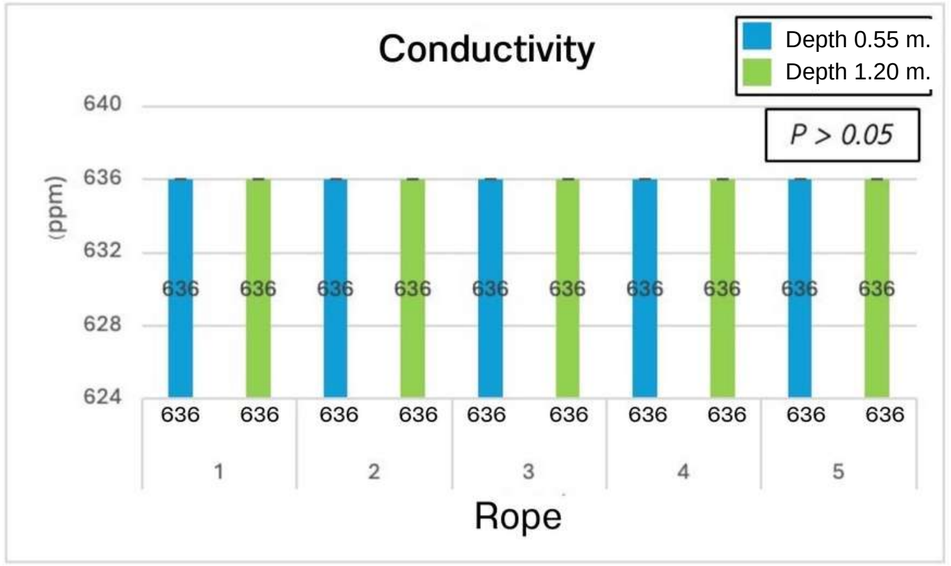




Results

Water quality chart





Results

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

The highest amount of plastics was found in the Be side the farm area.

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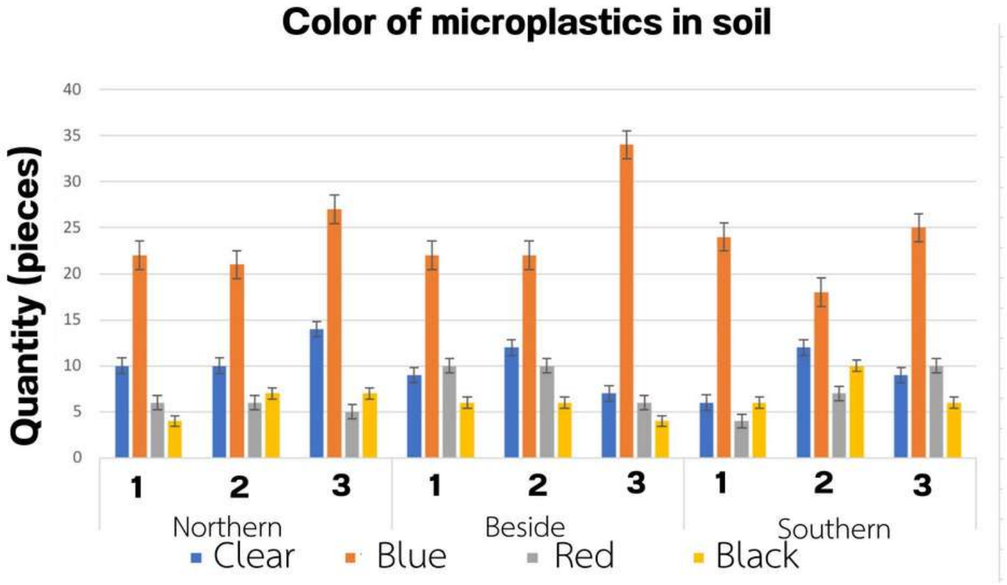
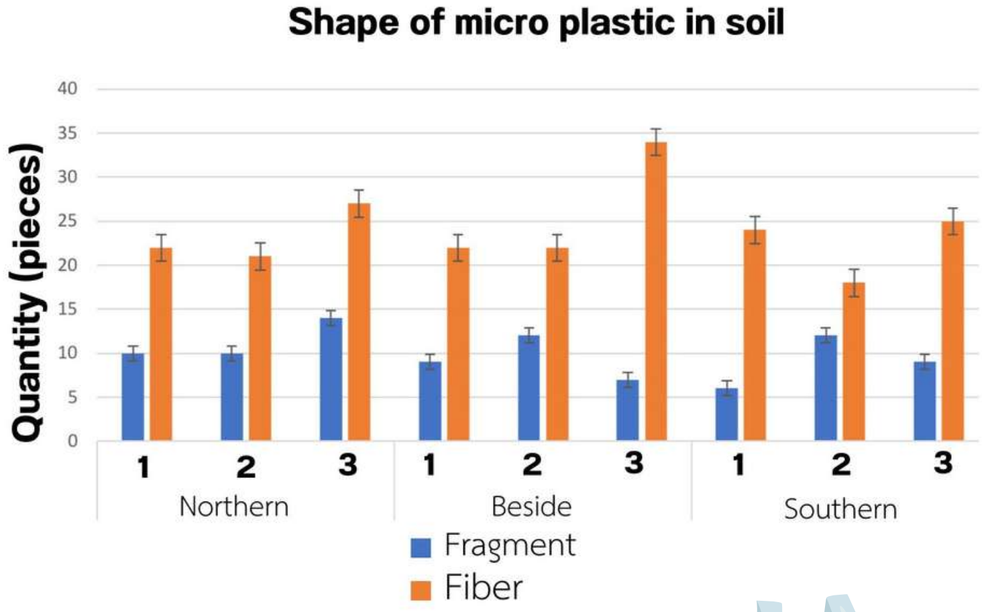
Most plastics found in the soil are larger than 5 mm. , which are not microplastics.
But we also found microplastics in many different sizes.

Results

The shape and color of microplastics in soil chart





Blue and fibrous microplastics were most commonly found.

Results

The amount of microplastic in the water table

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

More microplastics were found at a depth of 0.55 m. than 1.20 m.

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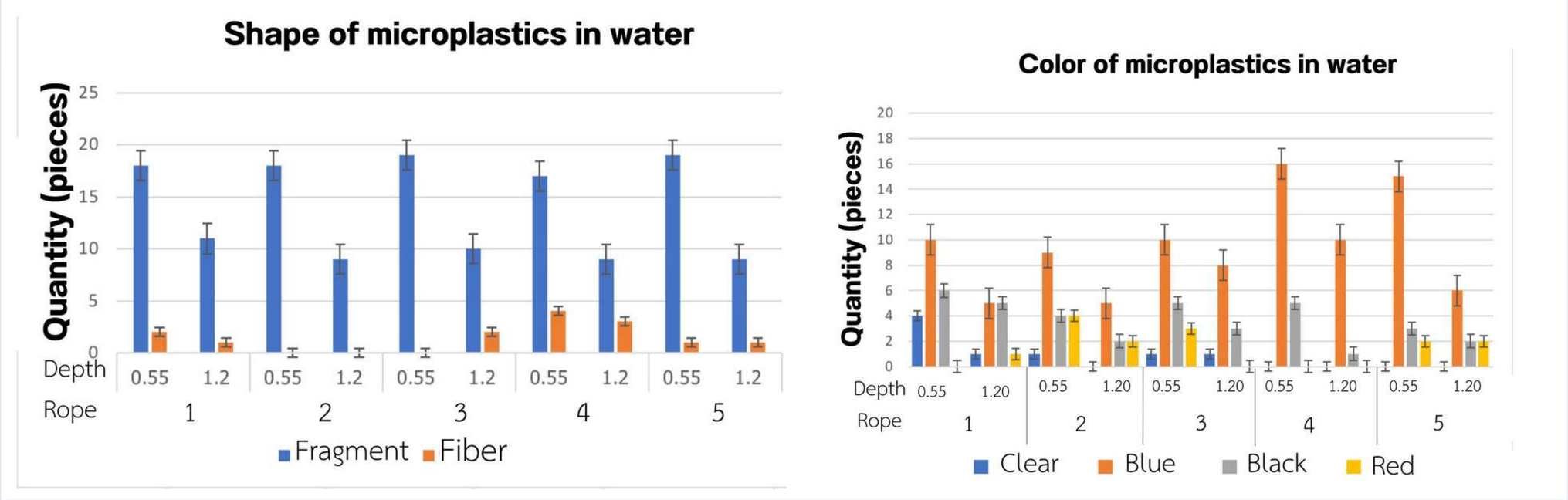
Results

The shape and color of microplastics in water chart



Blue and fibrous microplastics were most commonly found.

Results

The amount of microplastic in the oyster table

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

More microplastics were found in oyster at a depth of 0.55 m. than 1.20 m.

Results

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The most common microplastics are 300 µm. - 1 mm.

Results

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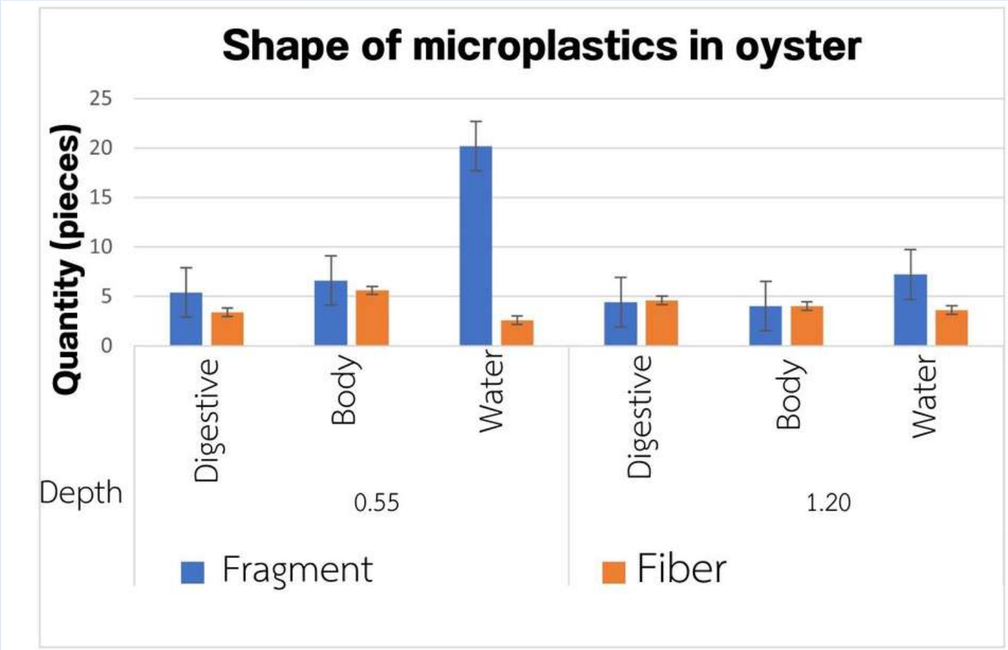
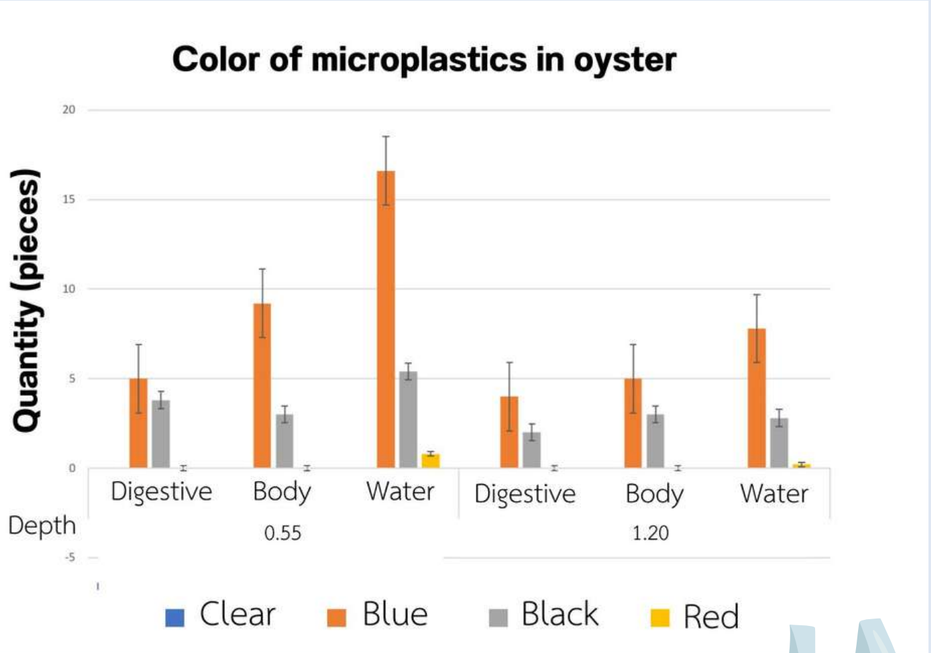
	Water in oyster	7.80 ± 1.72	3.00 ± 0.89	10.80 ± 1.96

Microplastics were found in water in oyster the most, followed by body and digestive traces, respectively.

Results

The shape and color of microplastics in oyster chart





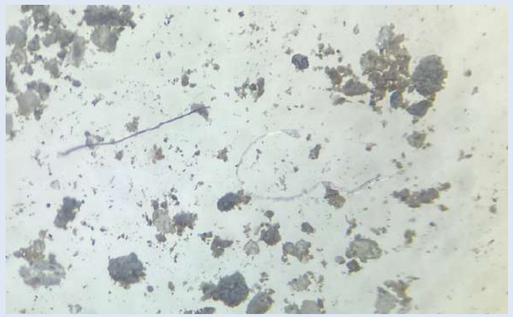
Blue and fibrous microplastics were most commonly found.

Results

Examples of microplastic characteristics found

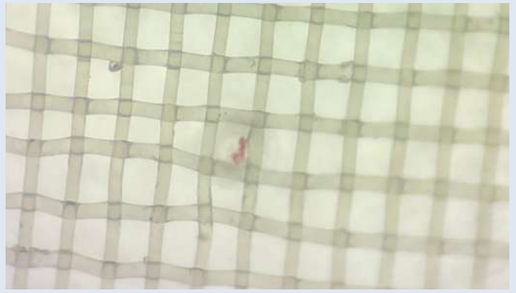
Red fiber

Black fiber



Clear fiber

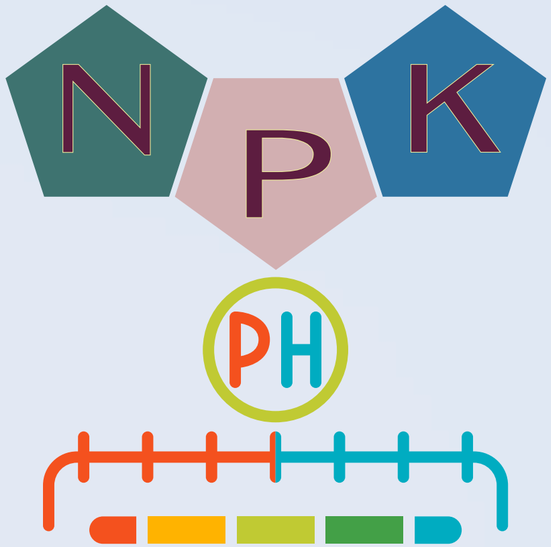
Blue fiber



Red frugment

Discussion

คุณภาพดิน



NPK and pH
no statistical significant

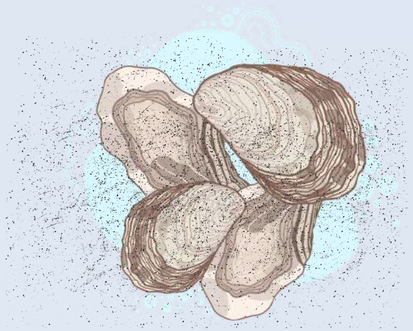
The amount of organic matter statistical significantThe soil under the farm had a higher amount of organic matter because it was close to the mangrove forest, unlike the area above and beside the farm where there are ports and houses.

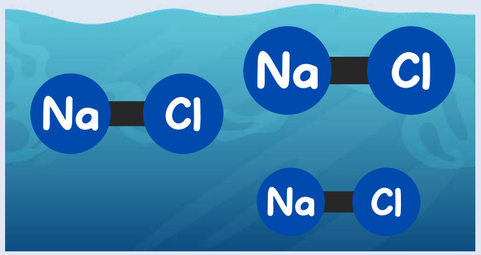
Discussion

คุณภาพน้ำ

NO_2

DO pH Nitrite
electrical conductivity
no statistical significant

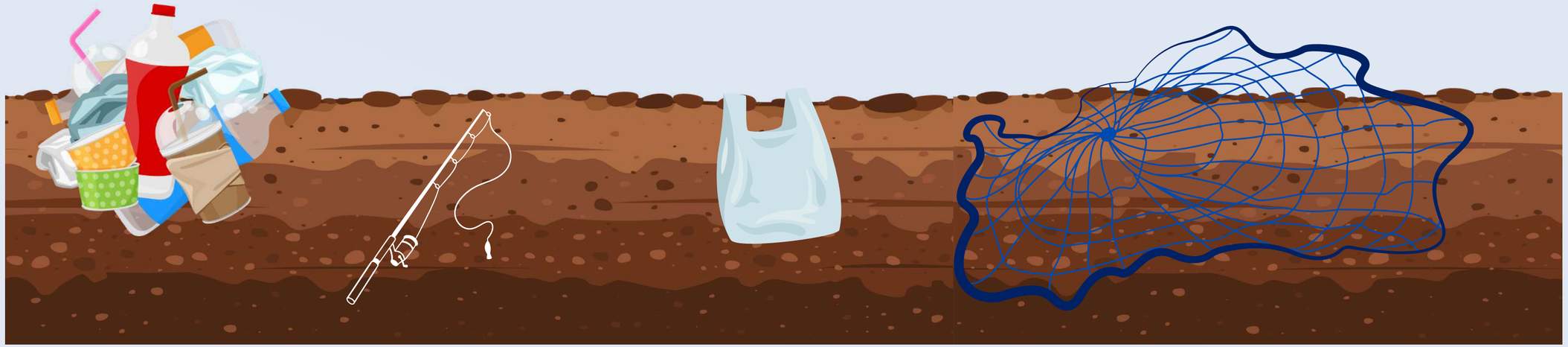




the turbidity and salinity values had a statistically significant differenceThe turbidity is a result of the number of oysters whose shells have accumulated sediment causing different turbidity. Still in the range of 20-22 ppt, which is the normal salinity of brackish water

Discussion

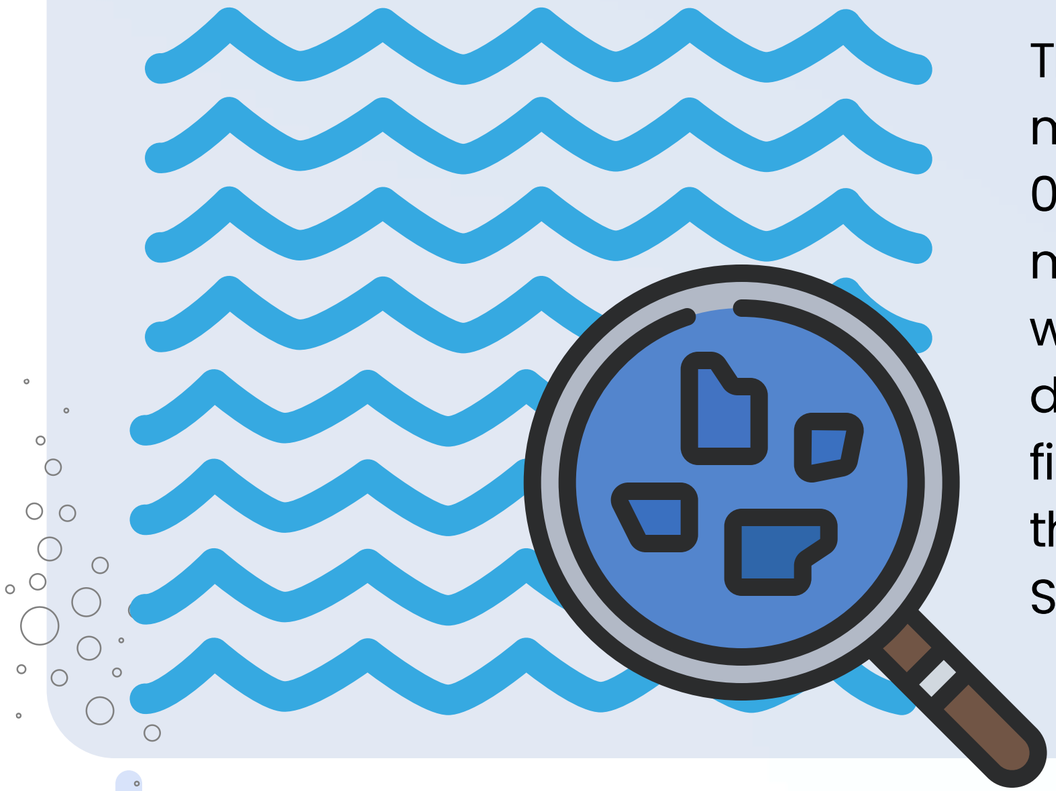
ไมโครพลาสติกในดิน



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.

Discussion

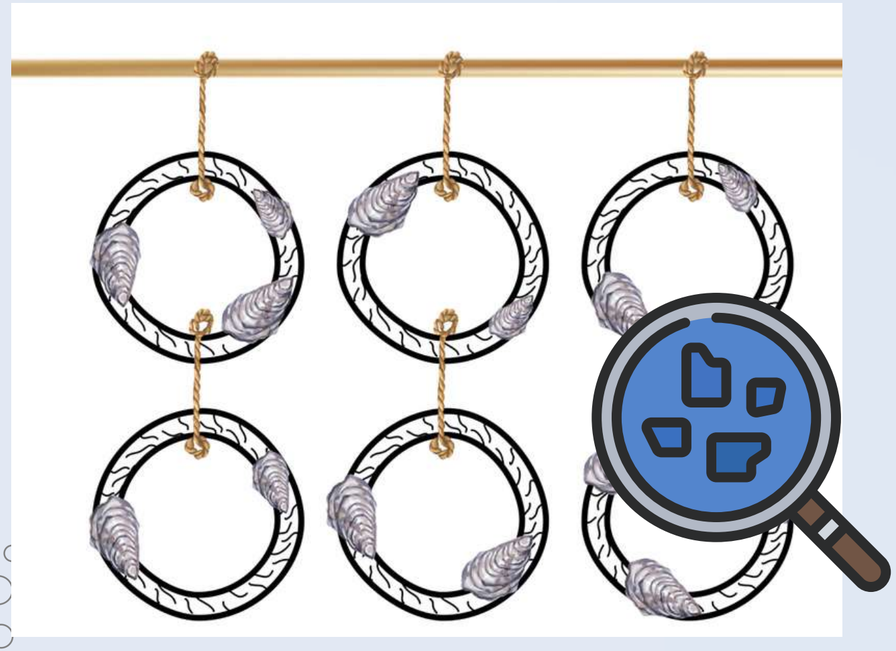
ไมโครพลาสติกในน้ำ



The amount of microplastics in the water 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 KAEN AGRICULTURE JOURNAL SUPPL. 1: 2021

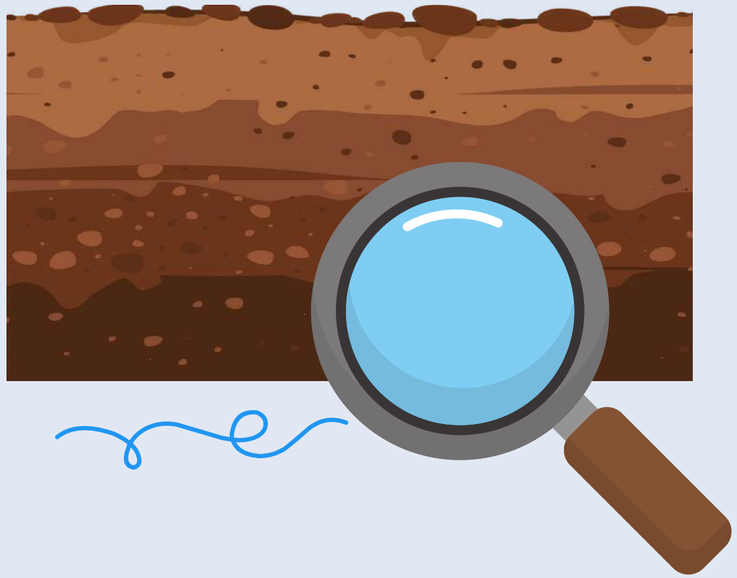
Discussion

ไมโครพลาสติกในหอยนางรม



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.

Conclusion



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.

Conclusion

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.

Conclusion

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.

Citation

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Thank you