LAMPIRAN A: MUKASURAT DEPAN LAPORAN INOVASI

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LAPORAN INOVASI PITEX SESI JUN2020 UNIT PENYELIDIKAN DAN INOVASI
TAJUK: OIL ABSORPTION USING BANANA STEM
PROJEK: FINAL YEAR PROJECT
JABATAN: KEJURUTERAN AWAM

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OIL ABSORPTION USING BANANA STEM

CAUSES OF PROBLEMS

RESEARCH PROBLEM

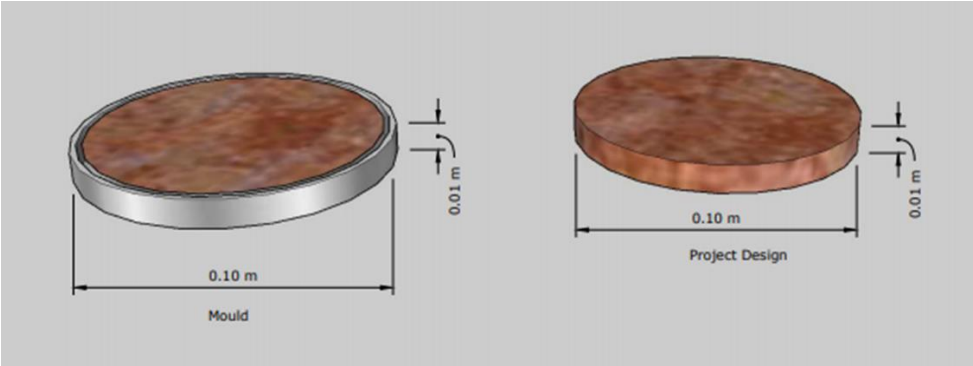
Mostly nowadays sorbent contain chemical substances that can affect the aquatic life. Despite the fact that polymer products (polypropylene, polyethylene and polyurethane) are the most widely used, one of their main disadvantages is their non-biodegradability.

Moreover, government spend big cost on the oil spills if oil leakage happened. With only using natural absorbent which is banana stem, they do not need to spend much cost because this is low cost product and also environmentally friendly.

METHODOLOGY RESEARCH

RESEARCH DESIGN

AUTOCAD MODEL DESIGN



The research design of our project is we using a circle mould with diameter of 10 cm to put the crushed banana stems. The measurement of the design is 10 cm of the diameter with 1 cm of the mould thickness. On the right diagram is the product. The product is put into a glass that fill with 300 ml of water that mix with the oil.

The research of the design will be conducted to determine the effectiveness of the banana stems as an oil absorbent.

DATA COLLECTION METHOD

We collected data through the previous research from literature reviews which is *Utilization of Silkworm Cocoon Waste As A Sorbent For Removal of Oil From Water by Journal of Hazardous Materials, Elsevier, Response Surface Methodology Optimization of Oil Removal Using Banana Peel as Biosorbent by Najaa Syuhada Mohamad Thani* and *An Absorption Capacity Investigation Of New Absorbent Based On Polyurethane And Rice Straw For Oil Clean Up.*

Through previous research, we will conduct some lab test in water lab to determine the main objectives of our study which is to determine the effectiveness of the banana stems as an

oil absorbent.

RESEARCH OF INSTRUMENTS

This instrument is a tool for the collection and measurement of data and information. It is to ensure that the instrument used is appropriate and achieves the goal of the project. Therefore, this study will only be used technically, where the data collection method used by researchers is based on the technic and the material used in each experiment by using google scholar. This google scholar is to facilitate the researcher to find previous research that related to the study which is as for us is there are some different material and methods used to determine the effectiveness in absorbing oil for oil removal.

DATA ANALYSIS OF THE BANANA STEMS

In this experiment, 300 ml of water is used for total 18 samples with the weight of the product is ±50 grams. The percentage of the oil absorption is calculated based on the results obtained using formula.

(Average sample/mass of oil x 100 = Actual value percentage)

SAMPLE WITH ENGINE OIL

Table 1: Absorption of banana stems on engine oil

Sample	Mass of water and engine oil (ml)	1	2	3	Average
1	300 ml water + 10 ml oil	50 ml + 9.5 ml	10 ml + 9 ml	20 ml + 9 ml	26.67 9.17
2	300 ml water + 20 ml oil	20 ml + 18 ml	50 ml + 15 ml	60 ml + 15 ml	43.33 16
3	300 ml water + 30 ml oil	20 ml + 23 ml	60 ml + 20 ml	20 ml + 20 ml	33.33 21

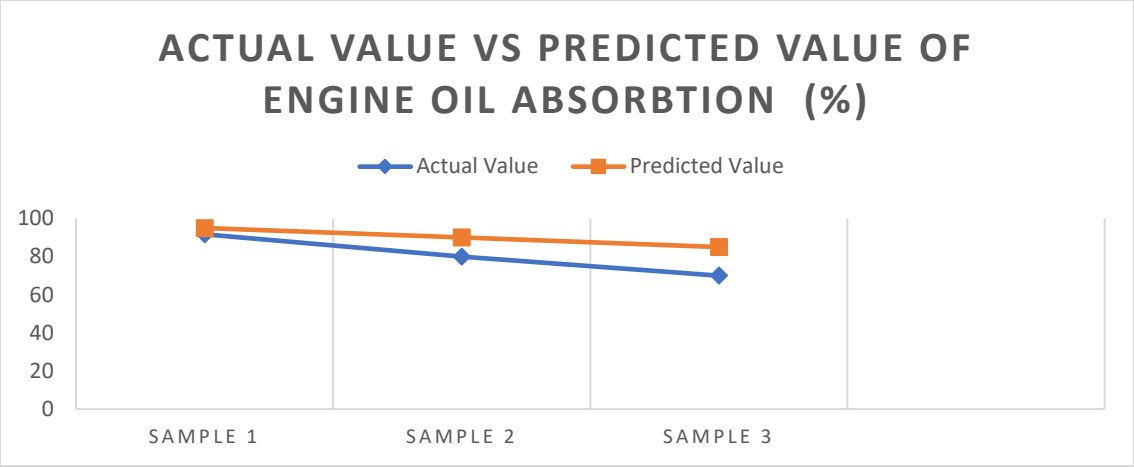
Table 1.2 : Percentage of engine oil absorbed in banana stems

Average Sample	Actual Value (%)	Predicted Value (%)
1	91.7%	95%
2	80%	90%
3	70%	85%

Actual Value (Sample 1) = 9.17/10 x 100 = 91.7%

Actual Value (Sample 2) = 16/20 x 100 = 80%

Actual Value (Sample 3) = 21/30 x 100 = 70%



Line graph 1

SAMPLE WITH COOKING OIL

Table 2 : Absorption of banana stems on cooking oil

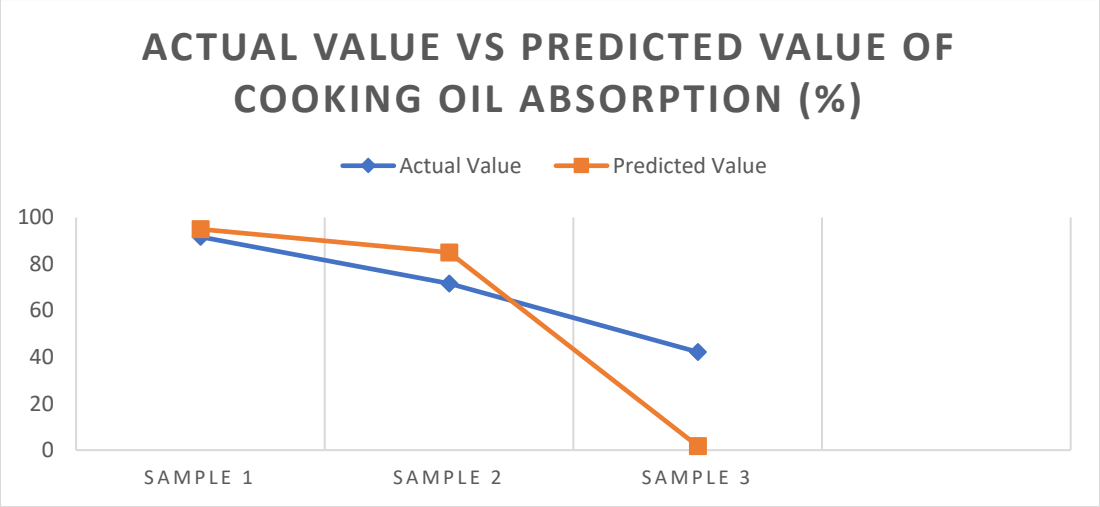
Sample	Mass of water and cooking oil (ml)	1	2	3	Average
1	300 ml water + 10 ml oil	50 ml + 9.5 ml	20 ml + 9 ml	20 ml + 9 ml	30 9.17
2	300 ml water + 20 ml oil	30 ml + 17 ml	20 ml + 11 ml	20 ml + 15 ml	23.33 14.33
3	300 ml water + 30 ml oil	50 ml + 17 ml	50 ml + 14 ml	20 ml + 7 ml	40 12.67

Table 2.1 : Percentage of cooking oil absorbed in banana stems

Average Sample	Actual Value (%)	Predicted Value (%)
1	91.7%	95%
2	71.7%	85%
3	42.2%	75%

Actual Value (Sample 1) = 9.17/10 x 100 = 91.7%
Actual Value (Sample 2) = 14.33/20 x 100 = 71.7%
Actual Value (Sample 3) = 12.67/30 x 100 = 42.2%

Line graph 2



From the results of the experiments using engine oil, the percentage of 10ml of the oil absorbed in the banana stems is 91.7%, as for 20ml is 80% and 30ml of oil is 70% absorbed to the banana stems. The actual values are a bit far from the predicted values as the predicted values for 10ml of engine is 95%, for 20ml of the oil is 90% and 30ml of the oil is 85%. This probably occurs due to the size and the mass of the banana stems that were used for the sample.

As for the results of the experiments using cooking oil, the percentage of the 10ml of the oil absorbed in the banana stems is 91.7%, as for 20ml of the oil is decreases to 71.7% and for 30ml of the oil is only 42.2% absorbed to the banana stems. The predicted values for the cooking oil are a bit far different as shown in line graph 2. This shows that cooking oil are a bit hard to absorb to the banana stems compare to the engine oil. This probably occurs due to the size and mass of the banana stems that were used in this experiment.

This also shows that the objective of the project is achieved because the banana stems can absorb more than 50% of the oil.

DATA ANALYSIS WATER LABORATORY

After obtaining the results for engine and cooking oil, the water samples for both oils are tested at water laboratory. The turbidity and water pH are conducted to ensure that the product is safe to be used at sea water and also river and to avoid any water pollution happen.

TURBIDITY TEST

Turbidity test for engine oil.

Table 3.1 : Turbidity test for 10ml of engine oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

Table 3.2 : Turbidity test 20ml of engine oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

Table 3.4 : Turbidity test for 30ml of engine oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

Turbidity test for cooking oil.

Table 3.4 : Turbidity test for 10ml of cooking oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

Table 3.5 :Turbidity test for 20ml of cooking oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

Table 3.6 : Turbidity test for 30ml of cooking oil

Water Samples	Result 1 (NTU)	Result 2 (NTU)	Result 3 (NTU)	Average (NTU)
Sample 1				
Sample 2				
Sample 3				

From the results of experiments to be conducted, the turbidity concentration of the water samples will be able to identify and it is very important to ensure that the water is safe using the banana stems as the oil absorbent and to ensure the product is safe to be used at sea water and also river and to avoid any water pollution happen.

PH AND TEMPERATURE TEST

Ph and temperature test for engine oil.

Table 3.7 : Ph and temperature test for 10ml of engine oil.

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

Table 3.8 : pH and temperature for 20ml of engine oil

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

Table 3.9 : pH and temperature for 30ml of engine oil

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

Ph and temperature for cooking oil.

Table 4.0 : ph and temperature for 10ml of cooking oil

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

Table 4.1 : ph and temperature for 20ml of cooking oil

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

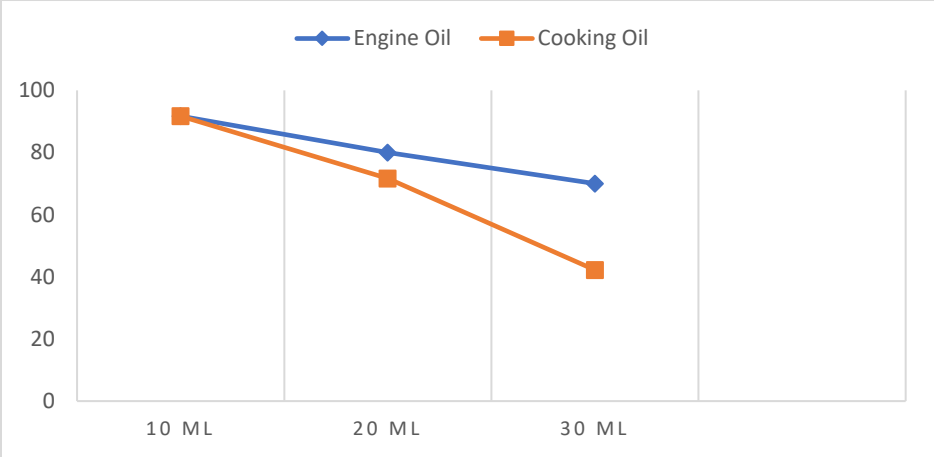
Table 4.2 : ph and temperature for 30ml of cooking oil

Water Samples	pH Result 1	pH Result 2	pH Result 3	Average
Sample 1				
Sample 2				
Sample 3				

From the results of experiments to be conducted, pH test of the water samples is conducted identify the concentration of the water sample and it is important to ensure that the product will not harm the aquatic life if the product is apply at the sea water or at any rivers and to ensure the standard quality of the water is remain the same.

COMPARISION IN RESULTS BETWEEN ENGINE OIL AND COOKING OIL

Types of oil	Percentage of oil absorb in banana stems		
	10ml	20ml	30ml
Engine oil	91.7%	80%	70%
Cooking oil	91.7%	71.7%	42.2%



Line graph above shows comparison between engine oil and cooking that absorbed to the banana stems. As for 10ml of both oil that were pour onto the banana stems, both of it were absorb in for 91.7%. The percentage dropped to only 80% for engine oil and as for cooking is 71.7% only. The results show that engine oil is more capable to absorbed more than the cooking oil. This is because in 30ml of oils, the percentage for engine oil is only decrease to 70% and for cooking oil the percentage decrease dramatically to 42.2%.

The factors that might influence the results probably because of the error occurs during the experiment such as quantity of the chemical materials. The size and the mass of the banana stems also one of the factors that influence the results for both type of oils and the errors occurs during the procedure of making the products affecting the results.

SOLUTION PROPOSAL

1. Using the right tools for the procedure (hot plate to mix calcium carbonate and stearic acid with banana stems)
2. Increase the amount of banana stem use in product, use bigger size of the product to absorb more oil in water.

BENEFITS OF PRODUCT

Waste materials are used to produce new product (goods for environment)

To increase the country's productivity in agriculture and reduce waste materials to the landfill, many waste materials are used to produce and innovate new products. For this project, the banana stems are used and combined with netting fabric to create a product to absorb the oil spill faced by our country. This is among our initiative as a student to diversify products from waste materials and do some testing to get the required data to validate our results.

Reducing costs for cleaning up oil spills (goods for economy)

Banana trees are available all over Malaysia and banana stem are being dumped after being cut down and take time to rot. So that the unused banana stem is used to produce an oil absorbent product because oil pollution is a major problem that needs to be addressed by the government and cost a lot of money. Hopefully our product can help to solve oil pollution and reduce the money spending on the maintenance of it. If our product is effective and cost saving, it is considered as another alternative to other existing products in the market.

METHOD OF IMPLEMENTATION

SAMPLING TECHNIQUES

As for our project we have 2 procedures. One is the procedure to create our products which is the banana stems and the other one is how to apply the product.

Banana stems mould procedures,

1. The banana stems is wash using clean water to clean up dirt on the banana stems.
2. The banana stems then is cut into small pieces and boiled for half an hour to makes the banana stems become soft so it would be easier to blend it.
3. The banana stems is weight for 1 kg and drain for 24 hours to ensure the unwanted water goes away.
4. Then, the 100g of banana stems is blend along with 20g of calcium carbonate.
5. While blending the banana stems with the calcium carbonate, boiling the 20g of acid stearic until it completely melted.

6. The blended banana stems then mix along with boiled acid stearic and put into the circle mould quickly before the acid stearic started to harden.
7. After putting the banana stems into the mould, the banana stems press completely into the mould to make sure that the thickness is 1cm.
8. The banana stems mould the dried completely until it hard and weight for 50g.

Procedure on how to apply the product with engine oil and cooking oil,

1. The product is put into a glass that contain 300 ml of water that mix with 10ml of oil.
2. Let the product sit in the water that mix with oil for 60 seconds.
3. After that, the product is taken out from the glass and the remain water is put into another glass to be put in the freezer for one night.
4. Then, the remain oil in the frozen water sample is scrap out and measured to be put into analysis data.
5. Step 1-4 repeated with 20g and 30g of oil.

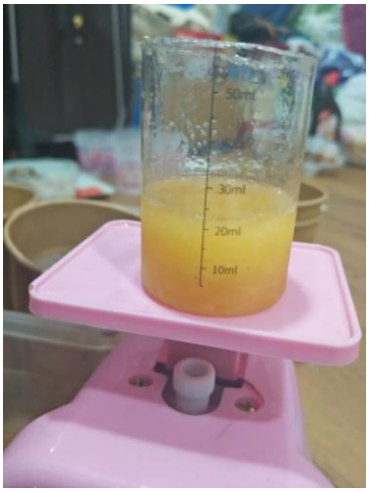
CONCLUSION

In nutshell, banana stems is very useful to us especially in industry field. Our project is to solve the problem of oil spills using banana stems as main materials, to ensure the product is effective and low cost. This research will be conducted to test the effectiveness of banana stems to absorb the oil. The experiment will be tested based on the amount of mass of oil absorbed by the product and result of the turbidity and pH of the water. Moreover, this research also is conducted to increase the use of biodegradable and environmentally friendly products. In the future, we can help the government to reduce the cost for oil spilling in our country and safe the environment.

From the analysis and the result, we can conclude that banana stems can be one of the natural absorbent as it is can absorb different types of oil such as engine oil and cooking oil. The results of the both engine oil and the cooking oil that are absorb to the banana stems are might a bit far from the predicted because the procedure of making the product might affecting the results of the both type of oils.

LAMPIRAN


1:00
C-Oil
10 W


50ml
30ml
20ml
10ml


1:00
C. oil
10 ml