DCC 6203

CIVIL ENGINEERING PROJECT 2

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CLASS: DKA5A

TITLE OF PROJECT:

MOBILIZER WATER FILTER

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DECEMBER 2019

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26	5.4				/
27	5.5		/		

CONTENTS

TOPIC 1
INTRODUCTION

1.1 BACKGROUND PROJECTS

Water is a transparent, tasteless, odourless, and nearly colourless chemical substance. It is a compound of two elements, hydrogen and oxygen. Water is the most abundant liquid on Earth. Water is vital to all plant and animal life on Earth.

Water filters use a blend of different kinds of media to attract the contaminants and prevent it from passing through the filter, and the clean water will be produced. Filter cleanses the water for multipurpose use in daily life.

Water filtration can provide better tasting and better smelling drinking water by removing chlorine, chemicals, pesticides, heavy metals and bacterial contaminants. Other uses of water filter are to remove lead from drinking water immediately before they drink it, eliminating the chance of a harmful substance entering their bodies

1.2 PROBLEM STATEMENT

The human body is made of 60% water, and this is a clear enough indication of the importance of water. Humans need to be adequately hydrated for their physiological systems to function and there are many important aspects of water. People who tend to do hiking, backpacking, or camping have difficulty to get a clean source of water to drink. Campers might have to drink all the water they have and don't have for emergency spare.

Our idea is to create a mobile water filter that's easy to use anytime and anywhere. It's not only made for emergencies but can use for daily basis . Able to filter any contaminate water and obtain at least a minimum water drinking ph which is between 6.5-8.5. Filtering could work at least 500 litre of water. Using an organic material such as rambutan seed, moringa seed. User can now have a mobile water filter that fit easily in their bag and could have clean water drink anytime.

1.3 OBJECTIVES

i) To produce a mobilizer water filter using organic plant.
ii) To produce water that has a standard pH, clear, colourless, odourless that will be acceptable for drinking.
iii) To test the quality of water before and after using a mobilizer water filter.

1.4 SCOPE OF STUDY

Scope of this project is to understand the overview about the uses and benefits of natural ingredients, (Moringa Seed and Rambutan Seed) for water. This project is dedicated to hikers or backpackers that will have difficulty getting clean water to drink. Other than that, pH, turbidity, and dissolved oxygen test will be conducted to check the quality of water.

This project will use natural ingredients such as Moringa Seed and Rambutan Seed that will reduce turbidity, colour, and have a suitable range for dissolved oxygen in water.

1.5 IMPORTANCE OF RESEARCH

Water filter can help in a healthy way for humans through their daily lives. It can purify the turbidity and the smell of the water. Now, all kinds of private water filters are in markets. However, most of this kind of water filters are only used for residential purposes, not in the outside residential areas like Forest, Recreation Park and others.

Moringa seed has good nutrition to human's body. It can give a good amount of energy to human's body. It also can purify water by removing the dirtiness of water. Rambutan seed was selected as coagulant to remove iron and manganese in groundwater, due to high seed oil content and Vitamin C which is believed to have high absorbent properties.

With this organic materials, we can say that all of these materials can help filter and purify water by their own nutritious content. But the function of these materials are the same because they can purify and give a good nutrition into the water so that it can

help humans through their daily lives in a healthier way. So conclusively, this organic materials can be used in water filters to make the water clean and purified.

TOPIC 2
LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is an explanation based on theory or literature on our research. In this topic is about to study all the problems solving and steps are taken for the project and described it briefly. Literature review is used to make research contents and to see the research that has been conducted in the field of the research and not just to summarize the research that has been studied by other researchers (Kumar, et. al, 2013).

Water filter is used to filter impurities from the water. Filtered water are used for drinking water, public or private aquarium and agriculture purpose. Commonly the water filter we see, most of them are used for residential purpose only.

On a regular basis, the water filter are used for residential purpose only. This is because the water becomes cleaner and healthier than drink the boiled tap water. Other than that, it is because of the lack of time to boil the water, so they just bought the water filter to save their time. The water filter is very convenient for daily life.

2.2 CONCEPT/THEORY

2.2.1 WATER

Water is a fluid that is odourless, colourless, tasteless and transparent that are found all over the Earth. Water flow as liquids in rivers, streams and oceans and the basis of the fluids of living organisms. Two thirds of the planet are covered by water. 97.5% of saltwater and freshwater are beyond our reach because it is locked into polar snow and ice.

Water is made up from billions of molecules. Each molecule is one oxygen and two hydrogen atoms held together by strong covalent bonds. Water is found in three different forms on Earth, gas, solid and liquid. The form of water depends on the temperature. The examples for the three different forms are solid as ice cube, liquid as rivers and gas in the atmosphere.

Water is an important resource with many uses including food production, cleaning, transportation, power generation, reaction and more. People can go weeks without food, but can only live a few days without water.

Water is important for hydration as drinking water. Water can be used for domestic purposes, examples like cooking and bathing. Water are important for emergency purposes for extinguish the fire. But less than 0.7% only used for humans.

2.2.2 FILTER

Filter is a porous device for removing impurities or solid particles from liquid or gas and that allows the fluid pass through but not the solid. The term “filtration” applies whether for medical, biological and physical filter. The fluid that passes through the filter are called as filtrate.

Filtration is typically an imperfect process because some fluid remains on the feed side of the filter or embedded in the filter media and some solid particles find their way through the filter.

There are different types of filtration, examples general filtration, vacuum filtration, cold filtration and hot filtration. General filtration is the basic filtration that using gravity to filter a mixture. Vacuum filtration is a Buchner flask and hose are used to create a vacuum to suck the fluid through the filter. Cold filtration is used to quickly cool a solution, prompting the formation of small crystals. Hot filtration is the solution, filter and funnel are heated to minimize crystal formation during filtration.

There a difference between filtration and sieving. Sieving is a technique where use a single mesh to retain large particles while allowing the passage smaller one. While filtration is has multiple layers that follow channels in the medium to pass through a filter.

2.2.3 WATER FILTER

Water filter to remove impurities from the water by lowering the contamination of water using the physical barrier, with chemical or biological process. Filter that used with different extents for any purposes such as agriculture irrigation, accessibility drinking water, public or private aquarium and the safe use of ponds and swimming pools.

Types of water filters include media filters, screen filters, disk filters, slow sand filter beds, rapid sand filters, cloth filters, and biological filters such as algae scrubbers.

Filtration systems for drinking water can include which activated carbon charcoal filter either designed within a pitcher or included as part of a faucet-mount or tap-installed filter, ultraviolet (UV) light units, reverse osmosis, water distillers or another form of water treatment process

2.2.4 SEED

Figure 2.1: Seed

Seed is an embryonic plant enclosed in a protective outer covering. The formation of the seed is part of the process of reproduction in seed plants, the spermatophytes, including the gymnosperm and angiosperm plants.

The term “seed” also has a general meaning that antedates the above anything that can be sown, eg. Potatoes seed, seeds of corn or sunflower seed. Many structures commonly referred to as ‘seeds’ are actually dry fruits.

There are a lot of benefits of seed. Example for healthy purpose. Seed can maintain for healthy hair and skin, for stabilise blood glucose, for protect heart health and can be used for filter the water. Seeds have been an important development in the reproduction and success of gymnosperm and angiosperm plants, relative to more primitive plants such as ferns, mosses and liverworts, which do not have seeds and use water-dependent means to propagate themselves. Seed plants now dominate biological niches on land, from forests to grasslands both in hot and cold climates.

2.2.5 MORINGA

Figure 2.2: Moringa Seed

Moringa is a native to parts of Africa and Asia, is the sole genus in the flowering plant family Moringaceae. The name is derived from murungai, the Tamil word for drumstick, and the plant is commonly referred to as the drumstick tree.

The Moringa oleifera tree grows abundantly throughout many tropical and subtropical regions of the world. The seed pods, seeds, leaves, roots and flowers are all edible and nutritious. Moringa seeds have the ability to kill bacteria and clarify water. 1 seed kernel will treat 1 liter (1.056 qt) of water.

The benefits of moringa are rich in nutrients, combats malnutrition, can be used for water purification, acts as an anti-inflammatory and antioxidants, boots heart health, support digestion and may help fight cancer (Joe Leech, 2018).

The seed cake remaining after oil extraction is used as a fertilizer and also to purify well water and to remove salt from seawater. Moringa seeds powder can remove 80-90% of dirtiness in water (Natumanya,2012)

According to Ashenafi Delelegn, Samuel Sahile & Azamal Husen (2018), aluminium sulphate as coagulant reduce the pH of water from 7.2 to 2.66 while the seed (moringa) extract water pH remained the same. Treatment of 0.016 g/L of Moringa oleifera decreased water turbidity from 208.3 nephelometric turbidity units (NTU) to 33.66 NTU (83.84%) and from 129 NTU to 16.8 NTU (86.98%) for the Shinta (Ethiopia) and Angereb (Ethiopia) river water samples, respectively. Moringa oleifera seeds contain proteins that have active coagulation properties and are being used for turbidity removal in many countries from.

2.2.6 RAMBUTAN

Figure 2.3: Rambutan Seed

The Rambutan or Nephelium Lappaceum, a fruit that considered as exotic to people outside of its range. To people who lived in Malaysia, Philipines, Thailand, Vietnam, Borneo and other countries of this region.

The rambutan fruit is rich with vitamins, minerals and beneficial plant compounds. It's rich in vitamin C, a nutrient that helps our body absorb dietary iron more easily and acts as an antioxidant, to protect our body's cells against damage. Rambutan contains copper, which give a proper growth and maintenance of various cells, including bones, brain and heart. The optimum rambutan seed dosages and pH was 100 mg/l and pH 3, resulting in > 90% turbidity removal.

Based on Zura Zainal Abidin (2014), the rambutan peel and seed are rich sources of nutrients, antioxidants and other beneficial compounds. In rambutan seed was found 1M NaCl to be an effective solvent for extracting the active coagulant agent in rambutan seed and gave about 99% turbidity removal. Rambutan seed coagulant exhibited faster sedimentation time due to bigger flocs formation and also smaller sludge volume than alum.

2.2.7 ACTIVATED CARBON (COCONUT SHELL)

Figure 2.4: Activated Carbon Coconut Shell

The term ‘coconut’ or the archaic ‘cocoanut’ can refer the whole coconut pal, the seed, or the fruit, which botanically is a drupe, not a nut. The term is derived from the 16th-century Portuguese and Spanish word coco, meaning ‘head’ or ‘skull’ after the three indentations on the coconut shell that resemble facial features.

Coconuts are known for their versatility of uses, ranging from food to comestics. Coconuts is highly nutritious, may benefits to heart health, may promote blood sugar control, contains powerful antioxidants and easy to add to your diet.

Coconut shells are also used to made charcoal which is use as fuel and this coconut charcoals are far better than other charcoals. Coconut shell charcoal is widely used to produce active carbon. Normally active carbon is known as the charcoal which has treated with oxygens. Active carbon is use for remove impurities.

The sources of activated carbon are mostly, coal (anthracite, bituminous, lignite), coconut shells, peat and petroleum based residues. Activated carbon (coconut shell) can remove odor, bad taste from tap water and also can filter chemical substance such as cholorine.

According to Suria Mohd Samdin, Lim Hooi Peng, Maryati Marzuki (2011) the efficiency of activated carbon from coconut shells effective absorbent material in drinking water filter due to of greater micro-pores, inexpensive and abundantly available over other agricultural by-products. Activation of the coconut shell carbon was first carried out by carbonization in the exposure to nitrogen (N2) atmosphere by heating with the activating agents for a specific retention period. pH test and dynamic

testing of filtered water were conducted, the pH value has achieved a constant value of 6.41 after eight times of filtering. The activated carbon has removed Methyl Tertiary-butyl Ether (MTBE) to non-detectable level. The non-detectable level has sufficiently reduced the odour and taste problems.

2.2.8 DRINKING WATER LEVEL

Table 2.1 :Table Standard Drinking Water

Ph	6 – 8.5
TURBIDITY	Not more than 5NTU and should be below 1 NTU
COLOUR TEST	Less than 15 units
DISSOLVED OXYGEN	80% - 120%

TOPIC 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will cover the details explanation of methodology that is being used to make this project complete and working well. Many methodology or findings from this field mainly generated into journal for others to take advantages and improve as upcoming studies. The method is use to achieve the objective of the project that will accomplish a perfect result.

3.2 RESEARCH DESIGN

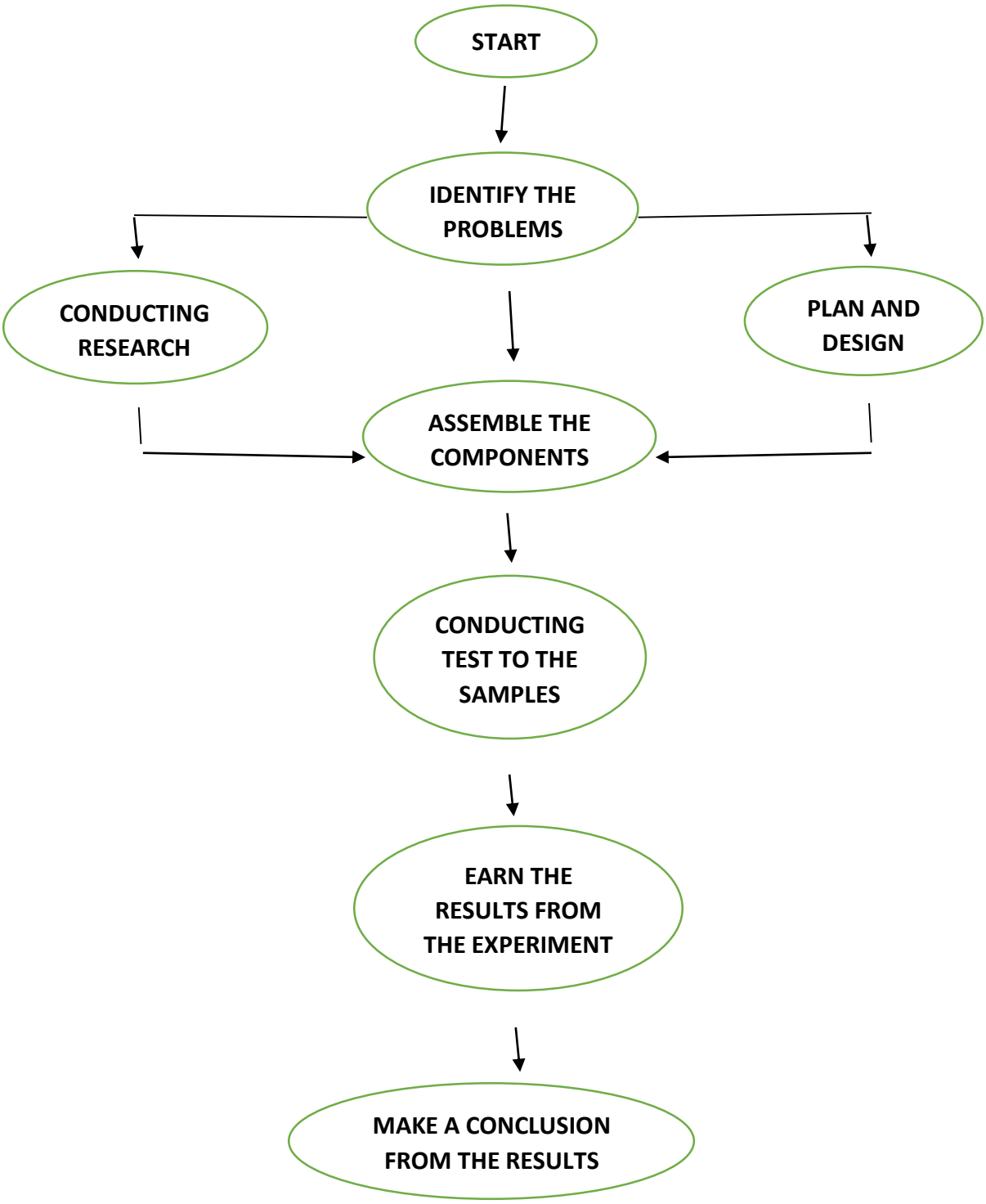


Figure 3.1 Research Design

3.3 PREPARATION OF MATERIALS

i) Powdered Rambutan Seeds

The Rambutan Seed has to be boiled for 3-5 minutes. Next, the Rambutan Seeds have to be cut to pieces and dried by exposing it to the sun for 2 to 3 days, or using an oven until the Rambutan Seeds dried properly. Lastly, once the Rambutan Seeds has been dried, the seed is grinded until it becomes small as powder.

ii) Powdered Moringa Seeds

The Moringa Seeds shell has to be peeled. Next, the Moringa Seeds have to be cut to pieces. If the The Moringa Seeds is wet, dry it by exposing it to the sun for 2 to 3 days, or using an oven until the Moringa Seeds dry properly. Lastly, once the Moringa Seeds has been dried, the seed is grinded until it become small as powder.

iii) Sands

Boiled The Sands that has been sieved at the size of 1,18mm and finer than it for 2-4 minutes. Next, washed The Sands until it clean. After that, let The Sands dried for 1-2 days.

v) Rambutan Seeds

The Rambutan Seeds has to be boiled for 3-5 minutes. Next, the Rambutan Seeds have to be cut to pieces and dried by exposing it to the sun for 2 to 3 days, or using an oven until the Rambutan Seeds dry properly. Lastly, once the Rambutan Seeds has been dried, the seed is grinded until it becomes small as the size of 3.3mm.

iv) Moringa Seeds

The Moringa Seeds shell has to be peeled. Next, the Moringa Seeds have to be cut to pieces. If the The Moringa Seeds is wet, dry it by exposing it to the sun for 2 to 3 days, or using an oven until the Moringa Seeds dry properly. Lastly, once the Moringa Seeds has been dried, the seed is grinded until it become small as the size of 3.3mm.

3.4 PREPARATION OF FILTER CYLINDER

i. The nylon pad is wrapped by clothes and placed inside the cylinder.

Figure 3.2 Filter Cylinder and Nylon Pad

ii. Mixed the dried fine Sands with the Activated Carbon until it mixed well. Mixed the 1.18mm size of Sands with the Activated Carbon until it mixed well.

Figure 3.3 Mixed Dried Sand

iii. Placed the mixed fine sand on top of the wrapped nylon pad-clothes. Placed the mixed 1.18mm size sands on top of the mixed fine sand and compacted it.

Figure 3.4 Filter Cylinder

iv. Placed the nylon pad on top of the last sand layer to keep the sand from flowing upwards.

Figure 3.5 Nylon Pad on Filter Cylinder

v) Place The 3.3mm size Rambutan Seeds and Moringa Seeds on top of the Nylon Pad.

Figure 3.6 Natural Seeds

vi) Attached the bottom half that contains the mixed sand-activated carbon with the top half of the cylinder.

Figure 3.7 Filter Cylinder

3.5 PREPARATION OF MOBILIZER WATER FILTER

i) Firstly, materials and components are prepared.

ii) The nylon pad is wrapped by clothes and placed inside the cylinder.

iii) Mixed the dried fine Sands with the Activated Carbon until it mixed well.

iv) Mixed the 1.18mm size of Sands with the Activated Carbon until it mixed well.

v) Put the mixed fine sand on top of the wrapped nylon pad-clothes and compacted it.

vi) Put the mixed 1.18mm size sands on top of the mixed fine sand and compacted it.

vii) Place the nylon pad on top of the last sand layer to keep the sands from flowing upwards.

viii) Place the moringa seeds and rambutan seeds on top of the nylon pad and place another nylon pad on top of it.

ix) Lastly, the Filter Cylinder is attached to the Mobile Water Filter Jug's lid.

x) The mobile water filter is ready to use.

xi) The hand pump is used to press down the water to be filter quickly.

3.6 MOBILZER WATER FILTER

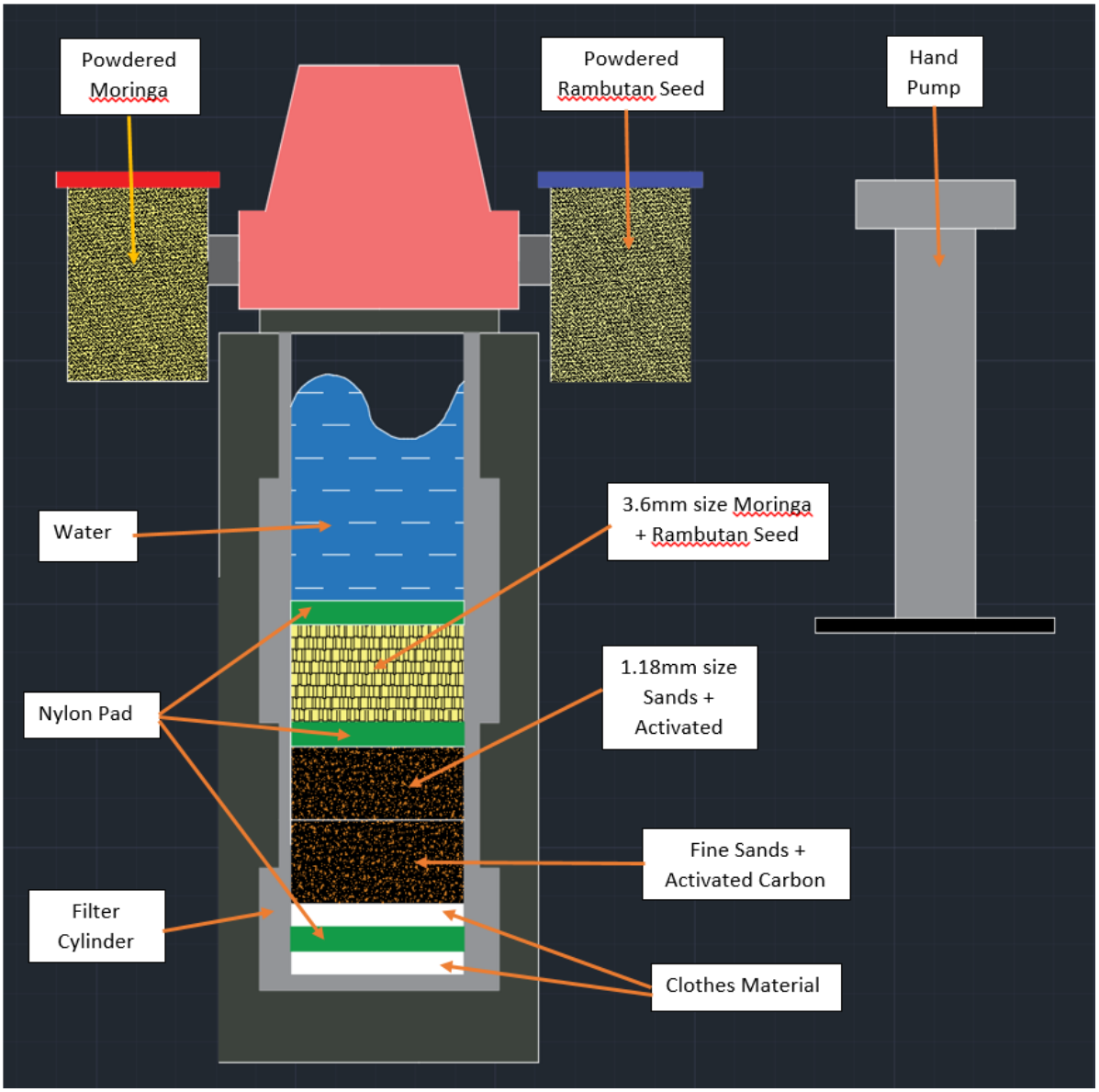


Figure 3.8 Mobilizer Water Filter

Figure 3.9 Mobilizer Water Filter

Figure 3.10 Filter Cylinder

3.7 MATERIAL USED IN MOBILIZER WATER FILTER (DESIGN)

3.7.1 TRITAN COPOLYESTER BOTTLE

Figure 3.11 Tritan Copolyester Bottle

Tritan is a new-generation copolyester that offers unexpected advantages, including clarity, toughness, heat resistance, chemical resistance, dishwasher safe and is BPA free.

Tritan is an amorphous copolyester with excellent appearance and clarity. Its most outstanding features are excellent toughness, hydrolytic stability, and heat and chemical resistance. This new-generation copolyester can also be molded into various applications without incorporating high levels of residual stress. Combined with Tritan copolyester's outstanding chemical resistance and hydrolytic stability, these features give molded products enhanced durability in the dishwasher environment, which can expose products to high heat, humidity and aggressive cleaning detergents.

3.7.2 SPONGE (POLYMIDE)

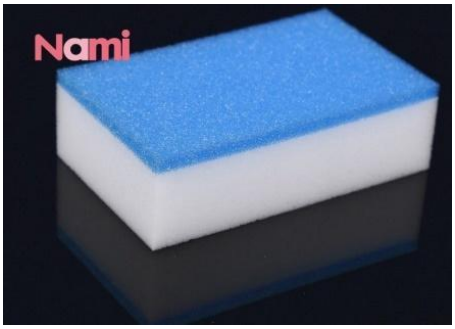


Figure 3.12 Polyamide (Nylon)

A polyamide is a macromolecule with repeating units linked by amide bonds. Polyamides occur both naturally and artificially. Examples of naturally occurring polyamides are proteins, such as wool and silk.

3.7.3 CLOTHES MATERIAL (COTTON)

Figure 3.13 Clothes Material (Cotton)

Typically made of cotton textile in a stockinette or jersey knit, it has a distinctively pliable texture compared to shirts made of woven cloth. A T-shirt is a style of fabric shirt named after the T shape of its body and sleeves.

3.7.4 POLYVINYL CHLORIDE PIPE

Figure 3.14 Polyvinyl chloride pipe

Polyvinyl chloride is the world's third-most widely produced synthetic plastic polymer, after polyethylene and polypropylene. About 40 million tonnes are produced per year. PVC comes in two basic forms: rigid and flexible.

The benefits of PVC pipe are , lightweight, coefficient in friction, longer length and felxibility.

3.8 EXPERIMENTAL METHOD (WATER QUALITY ANALYSIS)

3.8.1 OBJECTIVES

i) To perform turbidity and colour tests on a given set of water samples and to examine their progressive change as the water flows from one treatment unit to another in a waterworks.

ii) To perform pH and alkalinity analyses on a given set of water samples and to examine the results with respect to the water treatment processes.

3.8.2 THEORY

3.8.2.1 TURBIDITY

Figure 3.15 Turbidity Test

Turbidity is caused by suspended materials which absorb and scatter light. These colloidal and finely dispersed turbidity-causing materials do not settle under quiescent conditions and are difficult to remove by sedimentation. Turbidity is a key parameter in water supply engineering, because turbidity will both cause water to be aesthetically unpleasant and cause problems in water treatment processes, such as filtration and disinfection. Turbidity is also often used as indicative evidence of the possibility of bacteria being present.

Turbidity measurements performed using proprietary nephelometric instruments are expressed as Nephelometric Turbidity Units (NTU). The nephelometric apparatus is designed to measure forward scattering of light at 90° to the path of an incandescent light beam. Suspended particles present in a water sample reflect a portion of the incident light off the particle surface. The light reflected at 90° is measured by a photoelectric detector and is compared against light reflected by a reference standard. No interference exists for the turbidity test. Locally, the Public Utilities Board (PUB) of Singapore requires all water treatment facilities to produce water containing less than 1 NTU.

3.8.2.3 pH

Figure 3.16 : Turbidity Test

pH is a way of expressing the hydrogen-ion concentration of a solution. As acids and bases in solution dissociate to yield hydrogen ions [H+] and hydroxyl ions [OH-] respectively, pH is used to indicate the intensity of the acidic or alkaline condition of a solution.

Basically, the pH value is a good indicator of whether water is hard or soft. The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and with a pH greater than 7 is considered basic. The normal range for pH in surface water

systems is 6.5 to 8.5, and the pH range for groundwater systems is between 6 to 8.5. Alkalinity is a measure of the capacity of the water to resist a change in pH that would tend to make the water more acidic. The measurement of alkalinity and pH is needed to determine the corrosiveness of the water.

pH and alkalinity are key water quality parameters in environmental engineering practice. In the water supply and treatment fields, these parameters have great influence on the chemical coagulation, disinfection and softening processes, and corrosion control for water distribution pipe networks. Effective chemical coagulation of water, for instance, occurs only within a specific pH range. Chemicals used for coagulation release, as a by-product of their reactions with water to form insoluble hydroxide precipitates, hydrogen ions (acid-causing). If unchecked, these hydrogen ions could lower the pH of the water sufficiently to render the coagulants ineffective. The presence of sufficient amount of alkalinity in the water can react and remove the hydrogen ions released by the coagulants, thus buffering the water in the pH range where the coagulant can be effective.

3.8.2.5 DISSOLVED OXYGEN

Figure 3.17 : Dissolved Oxygen Test

Dissolved oxygen analysis measures the amount of gaseous oxygen (O2) dissolved in an aqueous solution. Oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement), and as a waste product of photosynthesis.

If water is too warm, there may not be enough oxygen in it. When there are too many bacteria or aquatic animal in the area, they may overpopulate, using DO in great amounts.

A high DO level in a community water supply is good because it makes drinking water taste better. However, high DO levels speed up corrosion in water pipes. For this reason, industries use water with the least possible amount of dissolved oxygen. Water used in very low pressure boilers have no more than 2.0 ppm of DO, but most boiler plant operators try to keep oxygen levels to 0.007 ppm or less.

3.9 DATA

Data collection is one of most important part in a report. Here is some estimation of the data that we will get from the experiment. Table of testing water quality of contaminated water after treated by organic material. Example of Water Quality Analysis table is at Table 3.1 below.

TABLE 3.1

WATER QUALITY			
TEST	**ORGANIC MATERIAL**		
	RAMBUTAN SEED	**MORINGA SEEED**	**MORINGA AND RAMBUTAN SEED**
PH			
DO			
TURBIDITY			

3.10 CONCLUSION

This section are the procedures in making the product. Other than that, to determine the pH, colour, turbidity, total coliform and composition of water using the mobilizer water filter.

In the end of this section, the pH, colour, turbidity, total coliform and water composition of the water are known by using our product, whether it is able and safe to drink or not.

TOPIC 4

RESULTS AND DATA ANALYSIS

4.1 INTRODUCTION

The introduction of this chapter aims to bring the reader into the picture of the study's findings based on the objectives and research questions. This chapter will explain the study that want to complete. Items that can be described in this section are response rates, parameters and findings.

This topic discusses data analysis that shows the results of a study done from experiments conducted to show PH levels, turbidity, Dissolved Oxygen in water filtered by Mobilizer Water Filter. The data collected from this experiments is to achieve the product objectives. The data collected will identified and improved the error and deficiencies of the product to ensures the product’s objectives are met. By this, the project's production objectives are accepted and the problem solved.

4.2 DISSOLVED OXYGEN, TURBIDITY AND pH OF WATER BEFORE AND AFTER PROCESS (USING DRY SEED)

4.2.1 Result of Dissolved Oxygen before and after using dry seed

Table 4.1 Result of DO before and after using dry seed

Types of water	Before	After
Moringa	68.8%	92.3%
Rambutan	68.8%	20.2%
Moringa+Rambutan	68.8%	53.4%

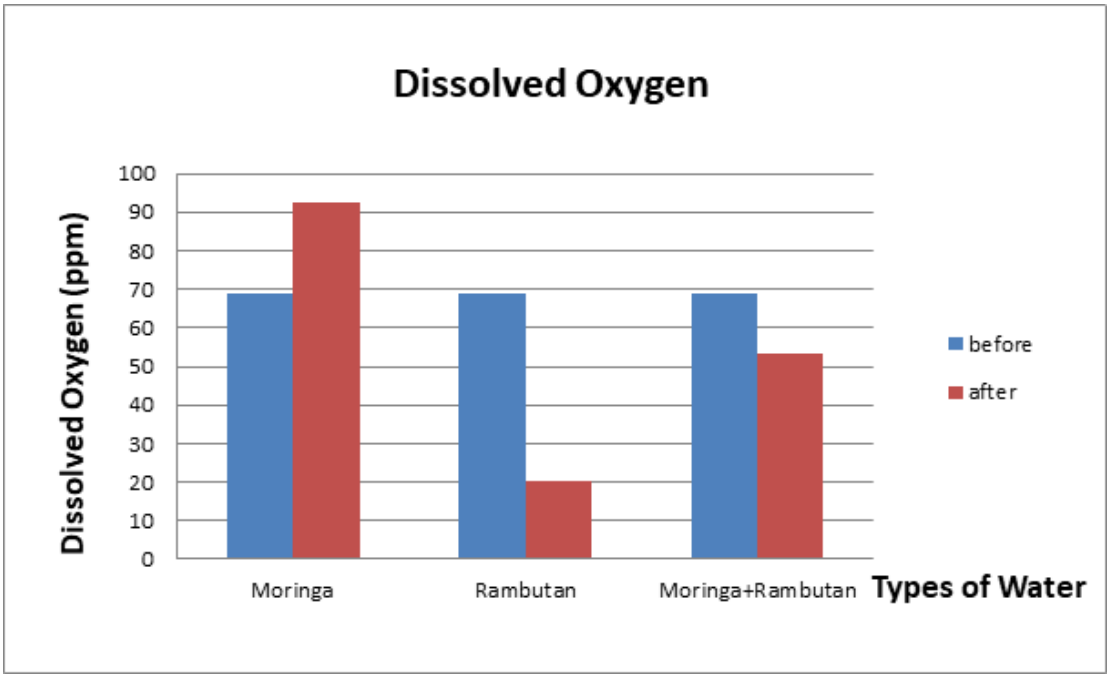


Figure 4.1 Result of DO before and after using dry seed

A Dissolved Oxygen (DO) was carried out to identify the DO of water before and after the experiment was 68.8%. Based on the graph and data, water contain Rambutan Seed achieved the standard of drinking water. The lowest number of DO the most effective water to drink.

4.2.2 Result of pH before and after using dry seed

Table 4.2 Result of pH before and after using dry seed.

Types of Water	Before	After
Moringa	5.33 pH	5.603 pH
Rambutan	5.33 pH	5.865 pH
Moringa+Rambutan	5.33 pH	5.478 pH

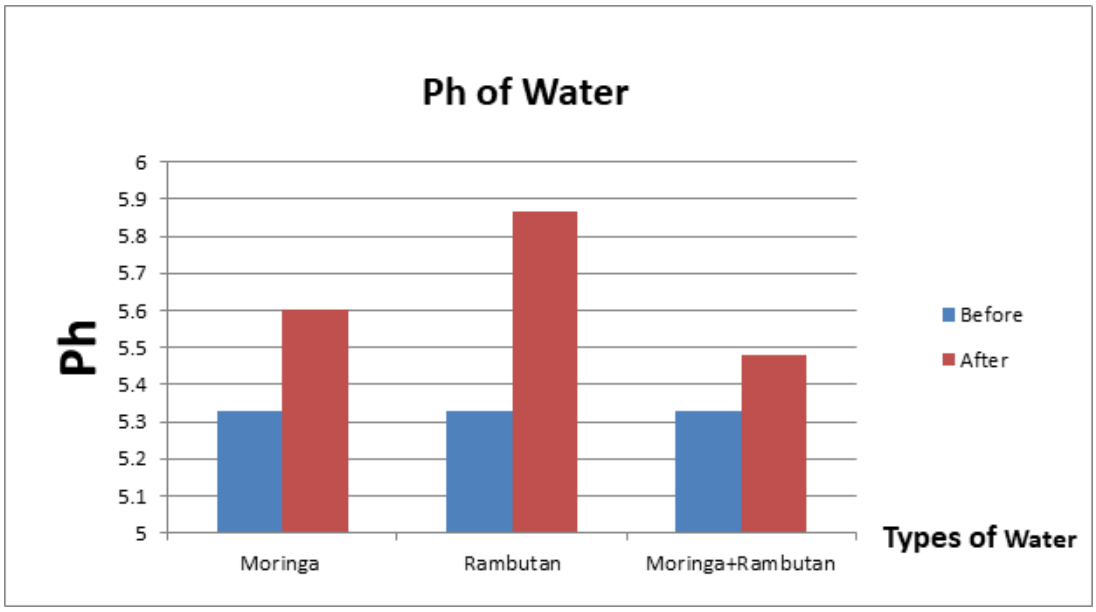


Figure 4.2 Result of pH water before and after using dry seed.

Based on the data and graph, none of them achieved standard pH for drinking water. Standard pH for water is in between 6.5-8.5 pH. But the nearest is water that contain Rambutan seed which is 5.865 pH.

4.2.3 Result of Turbidity before and after using dry seed

Table 4.3 Result of turbidity before and after using dry seed

Types of Water	Before	After
Moringa	2.03 Ntu	4.27 Ntu
Rambutan	2.03 Ntu	17.6 Ntu
Moringa+Rambutan	2.03 Ntu	9.43 Ntu

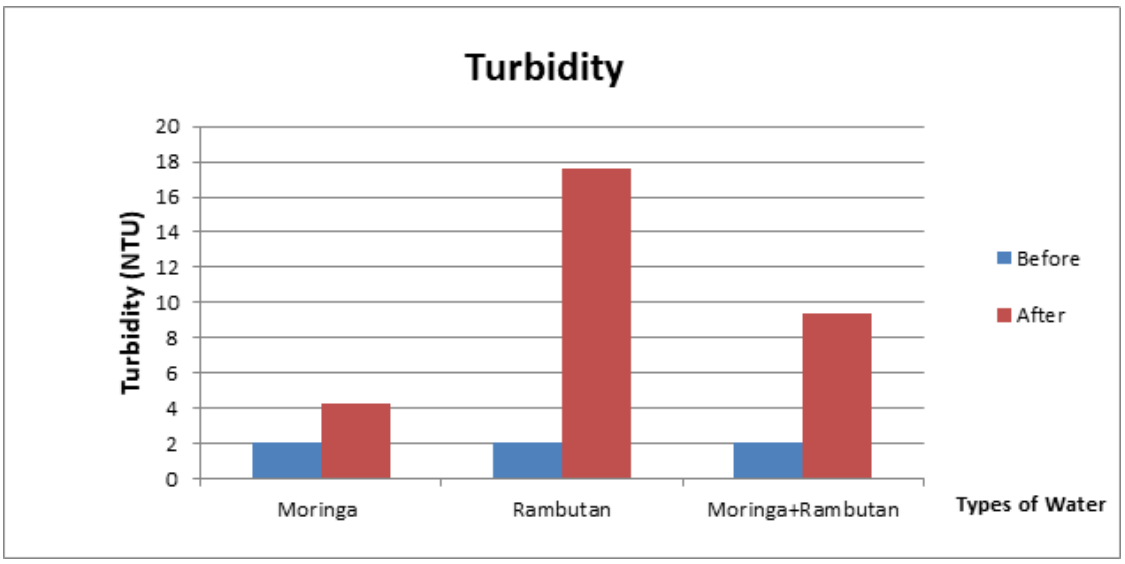


Figure 4.3 Result of turbidity before and after using dry seed

A Turbidity experiment was carried out to identify the turbidity of water before and after experiment by types of water that contains different seed. The water that have effective turbidity is water that contain Moringa seed where below than 5.0 NTU.

4.3 DISSOLVED OXYGEN, TURBIDITY AND pH OF WATER BEFORE AND AFTER PROCESS (USING POWDER)

4.3.1 Result of Dissolved Oxygen before and after using powder

Table 4.4 Result of DO before and after using powder

Types of water	Before	After
Moringa	68.8%	72.7%
Rambutan	68.8%	21.3%
Moringa+Rambutan	68.8%	38.0%

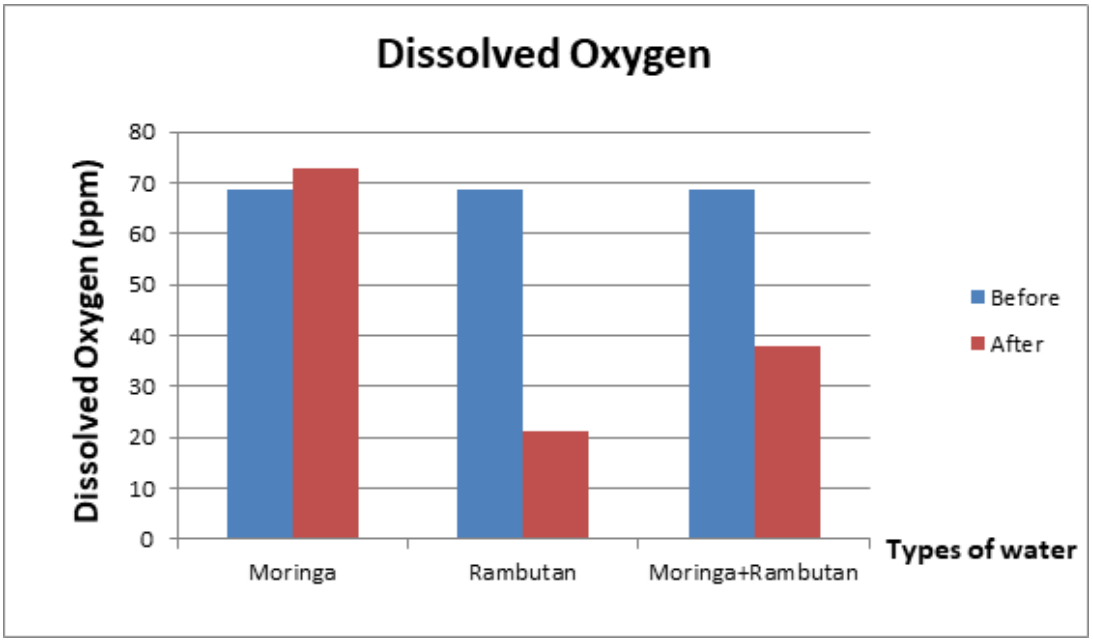


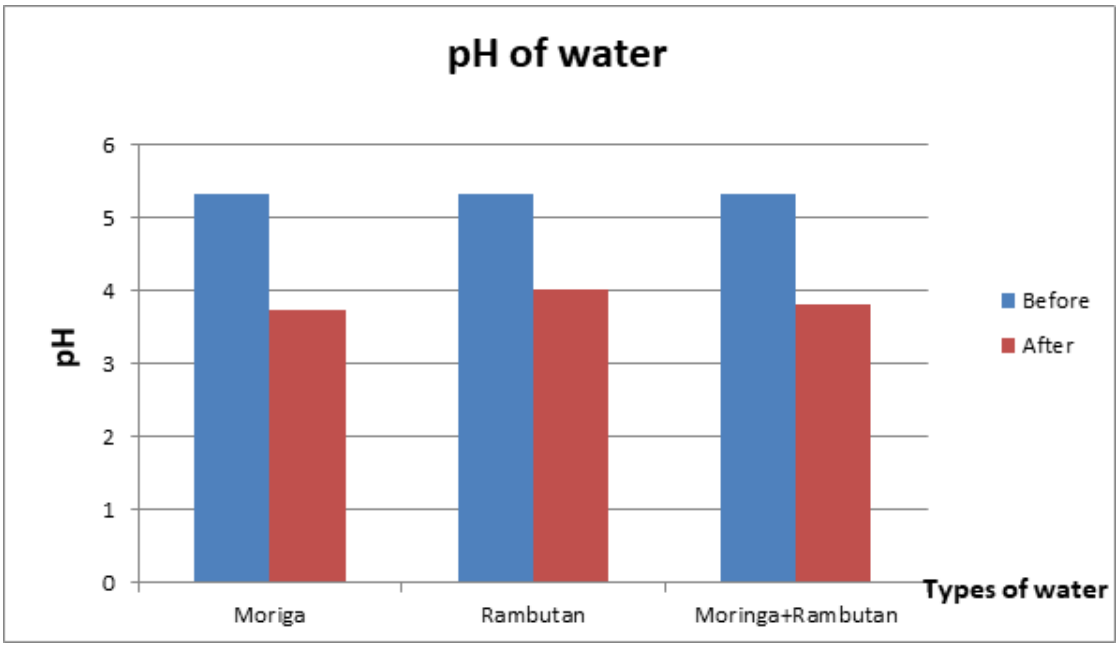
Figure 4.4 Result of DO before and after using powder

A Dissolved Oxygen (DO) was carried out to identify the DO of water before and after the experiment was 68.8%. Based on the graph and data, water contain Rambutan Seed achieved the standard of drinking water which is 21.3%. The lowest number of DO, the most effective water to drink.

4.3.2 Result of pH before and after using powder

Table 4.5 Result of pH before and after using powder.

Types of Water	Before	After
Moringa	5.33 pH	3.730 pH
Rambutan	5.33 pH	4.018 pH
Moringa+Rambutan	5.33 pH	3.801 pH



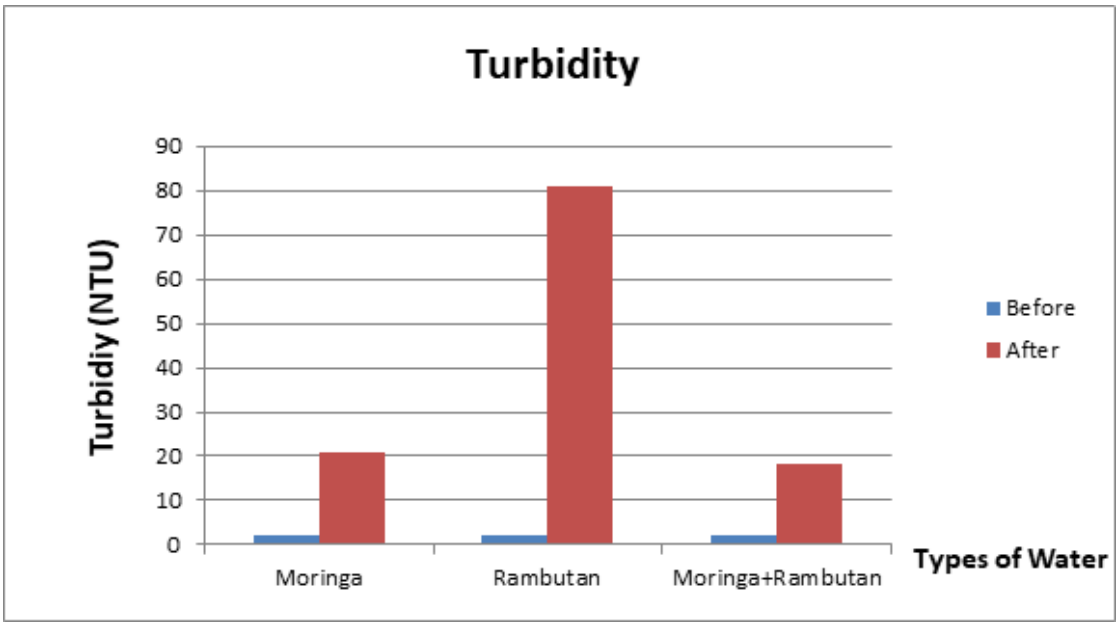
Graph 4.5 Result of pH before and after using powder.

Based on the data and graph, none of them achieved standard pH for drinking water. Standard pH for water is in between 6.5-8.5 pH. But the nearest is water that contain Rambutan seed which is 4.018 pH and the most acid is water that contain Moringa Powder.

4.3.3 Result of Turbidity before and after using powder

Table 4.6 Result of turbidity before and after using powder

Types of Water	**Before**	**After**
Moringa	2.03 Ntu	20.8 Ntu
Rambutan	2.03 Ntu	81.2 Ntu
Moringa+Rambutan	2.03 Ntu	18.3 Ntu



Graph 4.6 Result of turbidity before and after using powder

A Turbidity experiment was carried out to identify the turbidity of water before and after experiment by types of water that contains different seed. Based on the data and graph, none of them reached standard turbidity which is below than 5.0 NTU.

4.4 DISSOLVED OXYGEN, TURBIDITY AND pH OF WATER BEFORE AND AFTER USING WET SEED (RAMBUTAN SEED ONLY)

4.4.1 Result of Dissolved Oxygen before and after using wet seed (Rambutan Only.

Table 4.7 Result of DO before and after using wet seed (Rambutan Seed Only)

Before	After
68.8 PPM	18.5 PPM

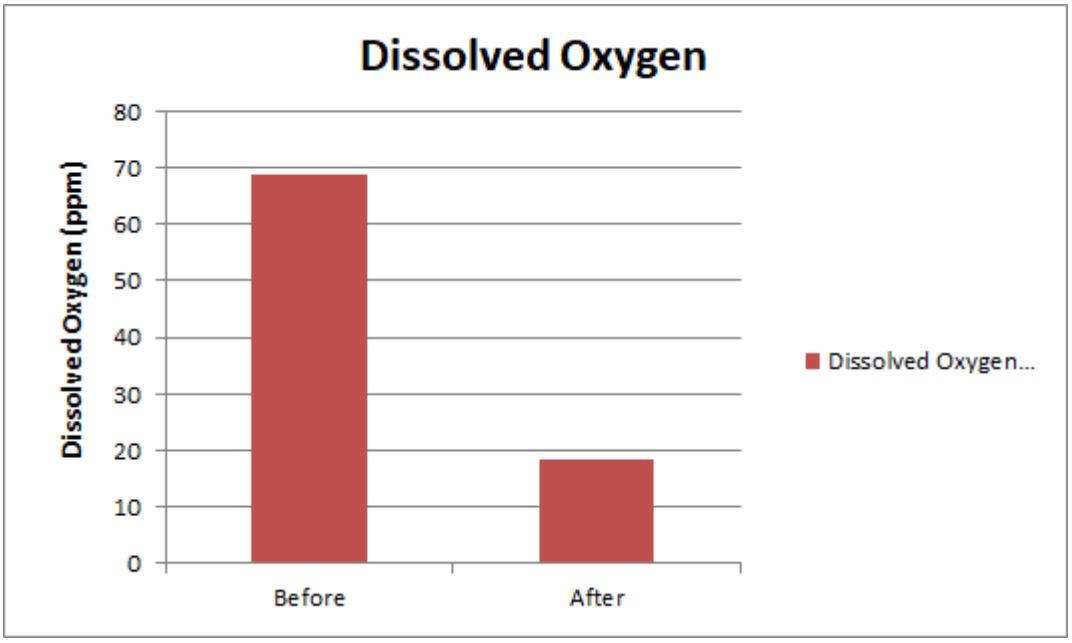


Figure 4.7 Result of DO before and after using wet seed (Rambutan Seed Only)

Do of water after using wet seed (rambutan only) getting lower than before which is from 68.8ppm to 18.5ppm.

4.4.2 Result of Turbidity before and after using wet seed (Rambutan Seed Only)

Table 4.8 Result of Turbidity before and after using wet seed (Rambutan Seed Only)

Before	After
2.03 NTU	17.5 NTU

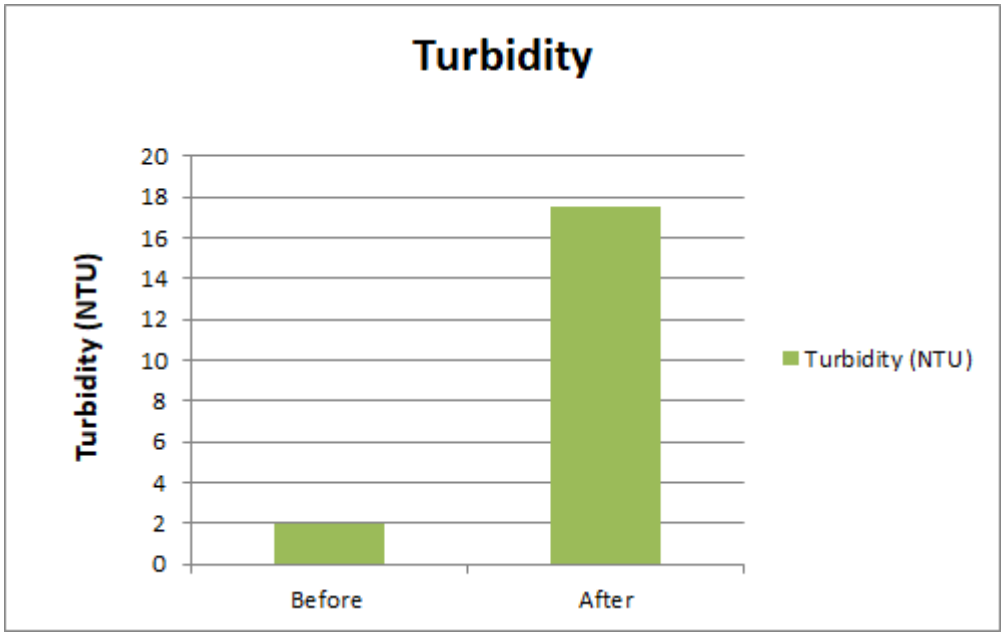


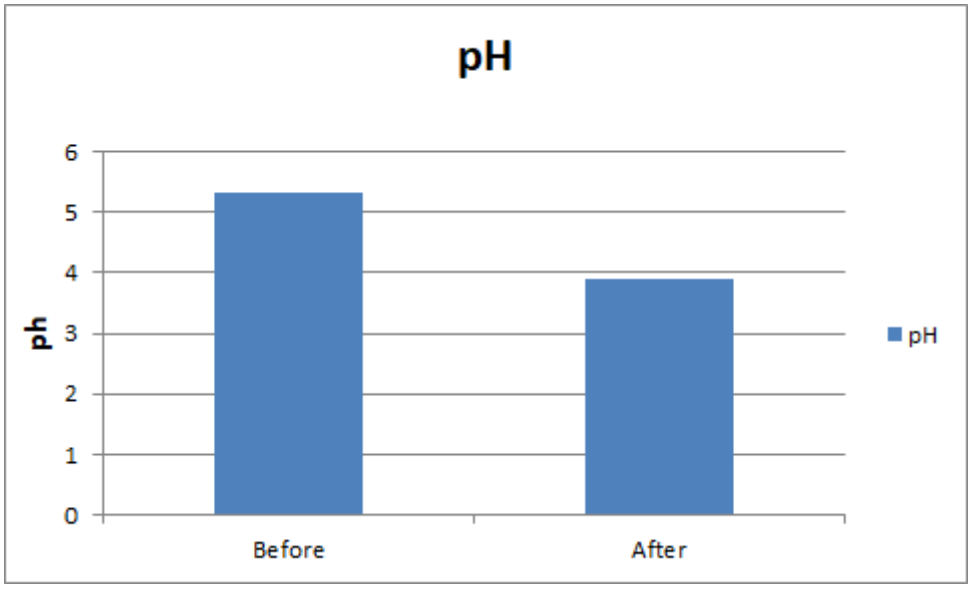
Figure 4.8 Result of Turbidity before and after using wet seed (Rambutan Seed Only)

Based on the data and graph, turbidity of water after using wet seed (Rambutan Seed) getting higher than before which is 17.5 NTU. So the water is not effective to drink.

4.4.3 Result of pH before and after using wet seed (Rambutan Only)

Table 4.9 Result of pH before and after using wet seed (Rambutan Only)

Before	After
5.33 pH	3.906 pH



Graph 4.9 Result of pH before and after using wet seed (Rambutan Only)

pH of water after using wet seed (Rambutan only) is not reached the standard pH for drinking water which is between 6.5-8.5 pH.

4.5 CONCLUSION OF RESULT

The data collected doesn't met the standard neither the objective. Due to the sand and activated carbon were insufficient in the filter. This is because the sand and the activate carbon are the material that help to reduce turbidity. Other than that, the overused of organic material are the factor of error considering that it supposed to help reduce the turbidity but when the overuse of it will increase the turbidity. Improvement will be made by adding more sand, activated carbon and reduce the usage of organic materials.

TOPIC 5

DISCUSSION AND CONCLUSIONS

5.1 INTRODUCTION

This chapter presents the findings of the reported study and its relevance to the objectives of the study. The discussion will be made by comparing the hypotheses' decisions to meet the objectives of the study. Through these discussions, conclusions about the study are obtained and through it some suggestions can be developed for future research, particularly in the related field.

5.2 DISCUSSION

From the data collected, almost all the results do not match according to the drinking water quality standard. According to the table 4.3 , it shows that only Moringa in a dry condition achieves the standard drinking water for the turbidity test which is 4.27 NTU. But, the results for the Moringa in dry conditions for turbidity tests are increased than the natural water. But it still achieved the standard drinking water. Moringa has the characteristics itself which produce floc and solidify bacteria in the water and sink it to the bottom.

For the pH result, it shows that the water after the test, it shows that it becomes acidic than tha natural one. This is because of a salty characteristic on the organic product that will let the ion negative of the organic plant react with the particles in the sample. The negative ion is acidic and makes the pH decreases. The table of 4.2 shows that Rambutan seed in dry condition almost gets into the standard water drinking level.

For the dissolved oxygen test, Moringa in dry seed achieved the standard dissolved oxygen standard. Which is 92.9%. If the DO result is too high, it will cause corrosion in the pipe system. The dissolved oxygen in drinking water is good because it makes the water taste good.

From the result, this project does not achieve the objective. This project uses 0.02gram for 500ml water. Maybe it is because either the quantity of water or the quantity of the organic plant that caused the result do not achieve the standard drinking water. Then, the characteristics of rambutan seed and Moringa seed also affected the

result. Moringa seeds have the ability to kill bacteria and clarify water while Rambutan Seed as an active coagulant agent in rambutan seed and gives about 99% turbidity removal. Between those two organic plants, moringa dry seed is efficient for turbidity and dissolved oxygen.

5.3 CONCLUSION

The process of completing a project that has been planned with much detail is actually pretty difficult as of having to face various obstacle and problem which only then it can be achieved even if its doesn't succeed. “Mobilizer Water Filter” is from an observation of campers and hikers to get clean water. This project want to have different in the implementation by its method and applications so it could be useful and beneficial to everyone. Maybe one day, this project will be marketed and become one additional equipment in the future even with the advanced equipment available in the market.

Skills of practical work that had gained from learning theory last semester basically brought this project to be more creative and more challenging creation. Through this exercise, it could nurture the spirit of cooperation and curiosity about something new as well as learning the next theory will prepare students to practice in the future. As from here, this project is not complicated in terms of water studies but requires a lot of imagination in the designing the creation of this project model.

5.4 RECOMMENDATION

Throughout the course of the study and testing, it was found that there was still room for improvement in improving productivity and product quality. Finally, some product improvement suggestions are made to solve the problem and at the same time produce better quality products in the future.

These organic seeds should be tested to find ways to make them more durable without rotting in the water filter, for example, using preservatives. Also, this water filter should be improved by adding pressure to the 'filter cylinder' so that water can be filtered out faster. Next, activated carbon powders should be used in larger sizes such as sand so that the sand and activated carbon mixtures do not become as muddy texture. The air hole should also be placed on the top of this water filter because in the absence

of this air hole, the water will not be filtered out because it has no external pressure. Lastly, this water filter should be improved by adding a product that can filter germs so that the water that is filtered by this water filter does not need to be boiled to kill the germs.

5.5 REFFERENCES

STYLE	CITATION AND RESEARCHES
APA	Ashenafi Delelegn, Samuel Sahile & Azamal Husen (2018). Water purification and antibacterial efficiency of Moringa oleifera Lam. https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-018-0177-1 Prapat Pentamwa (2011). Water Treatment by Using Lychee, Jackfruit and Rambutan Seed Coagulants. https://www.researchgate.net/publication/260341518_Water_Treatment_by_Using_Lychee_Jackfruit_and_Rambutan_Seed_Coagulants Phil McNamara (2017). 5 Benefits of Using Charcoal Water Filters https://www.waterfiltersfast.com/5-Benefits-of-Using-Charcoal-Water-Filters_b_64.html Suria Mohd Samdin, Lim Hooi Peng, Maryati Marzuki (2011). Investigation of Coconut Shells Activated Carbon as The Cost Effective Absorbent in Drinking Water Filter https://jurnalteknologi.utm.my/index.php/jurnalteknologi/article/view/6656 Zura Zainal Abidin (2014). Preliminary Study of Rambutan (Nephelium Lappaceum) Seed as Potential Biocoagulant for Turbidity Removal. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.843.8670&rep=rep1&type=pdf