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A Study Effectiveness of Moringa Oleifera as a Part of Water Purifier Sungai Melaka

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Abstract

Moringa Oleifera is a tropical plant whose seeds contain an edible oil and water-soluble substance which has excellent coagulation properties for treating water and wastewater. The efficiency and properties of Moringa Oleifera as a natural coagulant in water treatment were studied. The objective of this study is to determine the effectiveness of Moringa Oleifera seed powder as water purifier and to testing the water sample quality using turbidity and pH meter. For this study, water sample are collected at Sungai Melaka. For the testing, 6 sample of water prepared divided into 2 categories for 0.5g and 1.0g Moringa Oleifera. . Moringa Oleifera seed used as coagulant in powder form. This study used different dosage of Moringa Oleifera seed powder which was 0.5g and 1.0g to test the effectiveness of Moringa Oleifera as water purifier. As in the result, the 0.5g and 1.0g dosage of Moringa Oleifera seed powder showed good results for this treatment in terms of turbidity as well as pH value. It does not affect the pH value too much because the pH still remain in the state of the National Water Quality Standards for Malaysia in the range of 6.0- 9.0. A prolonged sedimentation time of the longer the sedimentation time taken the better the results given with Moringa oleifera as part of the coagulant substance in the treatment of raw water. It is also, a natural material and economic

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kunci: Moringa Oleifera, coagulant, water treatment, turbidity, pH,

INTRODUCTION

A river is defined as a large natural stream of water emptying into an ocean, lake, or other body of water and usually fed along its course by converging tributaries. Rivers and streams drain water that falls in upland areas. Moving water dilutes and decomposes pollutants more rapidly than standing water, but many rivers and streams are significantly polluted all around the world. With the World Rivers Day just around the corner, the World Wide Fund (WWF) Malaysia is calling on Malaysians to place serious attention on the issue of water pollution in the country. According to WWF Malaysia CEO Datuk Dr Dionysius Sharma (2015), the issue had become a serious problem in Malaysia and had led to negative impact on the sustainability of the country's water resources.

The challenge of improving water quality in water-stressed areas of the world may have a natural champion in the Moringa Oleifera tree. The Moringa Oleifera Moringa oleifera is one of the most valuable plants known to mankind, since decades. It is a native of the sub-Himalayan region, Asia, Africa and Arabia, and is gaining popularity in several Western countries. The seedpods, seeds, leaves and roots are all edible and nutritious (Kajal, 2017). In addition to these benefits, something in the tree's seeds has the ability to kill bacteria and clarify water. In recent years, the water-clarifying ability of Moringa powder was found to be due to a positively-charged protein called the Moringa Oleifera Cationic Protein (MOCP). (Jennifer Swales & Stephanie Velegol, 2015).

Moringa tree's leaves is best known as an excellent source of nutrition and natural energy booster. This energy boost is not based on sugar, and so it is sustained. It help lowered blood pressure and is a sleep aid. For the roots, Moringa Oleifera roots are known for their antibiotic properties and based on that, they are used to treat variety of conditions and illnesses like Asthma, Endocrine Disorders, Digestive Disorders, Gastritis, Inflammation, Rheumatism, Nervous Disorders, Reproductive Health and Skin Disorders (Moringa Fact, 2013).

Furthermore, Moringa seeds are used as a coagulant. the water-clarifying ability of Moringa seed powder was found to be due to a positively-charged protein called the Moringa Oleifera Cationic Protein (MOCP). When crush the seeds and add them to water, this protein will kill some of the microbial organisms and cause them to clump together and settle to the bottom of the container (Jennifer Swales & Stephanie Velegol, 2015).

However, the dried seed powder alone is not ideal for water purification because the organic matter from the seed will remain in the water, providing a food source for any bacteria that have not been killed. As a result, water treated with this seed does not remain safe to drink after some time in storage (Jennifer Swales & Stephanie Velegol, 2015).

SOME OF IMPORTANT ELEMENTS

Sampling could be defined as a process of selecting a portion of material small enough in volume to be transported conveniently and handled in the laboratory, while still accurately representing the part of the environment sampled. The main difficulties in sampling are representativeness and integrity. For rivers, the primary sampling point is in the surface water layer (0-5 cm from the surface) at the center of the main flow. However, the top 1-2 cm of this surface layer should be avoided so as not to collect floating dust, oil, etc. In addition, further samples can be collected through the full depth of the water column if required to meet the purpose of the study.

Moringa oleifera is popularly known in many countries as a “miracle plant” because of its nutritional and medical properties. Moringa oleifera belonging to the family of Moringaceae is an effective remedy for malnutrition. Moringa oleifera seeds have a unique and enjoyable appearance. The seeds have sets of thin flaps extending from the main kernel. These flaps serve as wings to carry the seeds away from the mother Moringa tree. With the help of the wind, the seeds move across the ground until they find a resting place to germinate and become a tree.

The best place to get Moringa seeds is as close as possible to where they will be grown. This will make sure that the seeds will be most resilient to the local climate and conditions. If Moringa grows in your region, you can just collect seeds from those Moringa trees. Look for pods that are dry and have turned brown. Moringa seeds are produced annually in the tropical and sub-tropical countries. Like the rest of the Moringa plant, the seeds are highly valued, as they give us the incredibly nutrition.

Moringa seed powder can be used as a quick and simple method for cleaning dirty river water. Studies showed that this simple method of filtering not only diminishes water pollution, but also harmful bacteria. The moringa powder joins with the solids in the water and sinks to the bottom. This treatment also removes 90-99% of bacteria contained in water. Water from varying sources will need different amounts of Moringa seeds powder because of the impurities present will not be the same.(The Miracle Tree, 2020)

METHODOLOGY

Collection and Preparation of Moringa Oleifera Seeds Powder

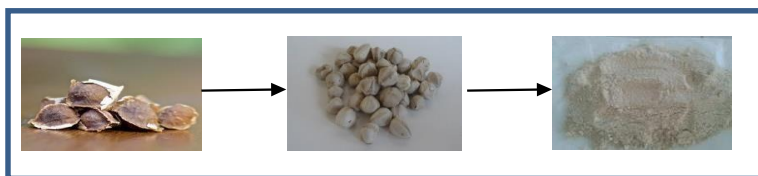


Figure 3.1 : Preparation of Moringa Oleifera Seeds Powder

A. Procedure of Preparation Moringa Oleifera Seeds Powder

- i. High quality pods, those which were new and not infected with disease and insects were selected.
- ii. Seeds were opened from pods and let it dried.
- iii. Hulls and wings from kernels were removed manually to increase the effect of powder as coagulant and to reduce the waste sludge formation.

- iv. Fine powder was used as coagulant for analysis.
- v. The powder was weighted in two different dosage which are 0.5g and 1.0g.

B. Laboratory Test



Figure 3.2 : water sample of 0.5g and 1.0g dosages of MO seeds powder



Figure 3.3 : 2100p Hach Turbidity Meter



Figure 3.3 : Hach pH Meter

RESULTS AND DISCUSSION

Demografi

Table 4.1 : Details of water sample

Sample	Settling Time By Moringa Oleifera (Hour)	Dosage Of Moringa Oleifera Powder (Gram)	pH before treatment
A	1	0.5	7.09
B	2	0.5	7.09
C	3	0.5	7.09
D	1	1.0	7.09
E	2	1.0	7.09
F	3	1.0	7.09

Findings 1

Table 4.2 : Result of turbidity with 0.5g and 1.0g dosage of Moringa Oleifera Powder

Sample	Settling Time By Moringa Oleifera (Hour)	Dosage Of Moringa Oleifera Powder (Gram)	Turbidity with 0.5g dosage of Moringa Oleifera Powder (NTU)		Turbidity with 1.0g dosage of Moringa Oleifera Powder (NTU)	
			Before	After	Before	After
A	1	0.5	588	47.2		
B	2	0.5	588	46.7		
C	3	0.5	588	38.6		
D	1	1.0			588	106.0
E	2	1.0			588	72.1
F	3	1.0			588	42.4

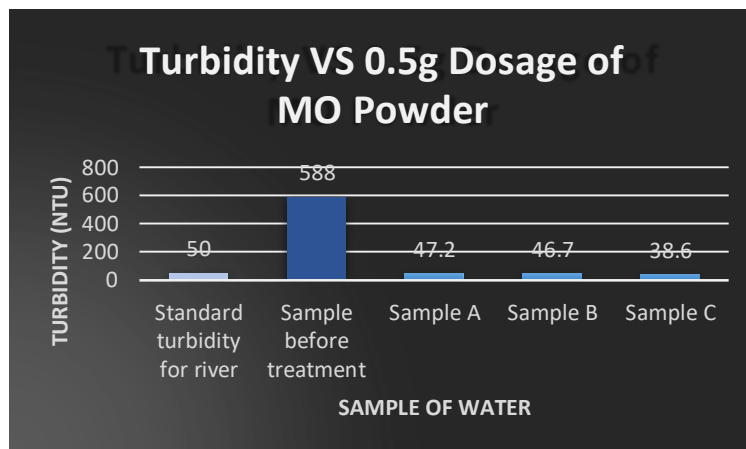


Figure 4.1: Turbidity value of water sample with 0.5g dosage Moringa Oleifera Powder

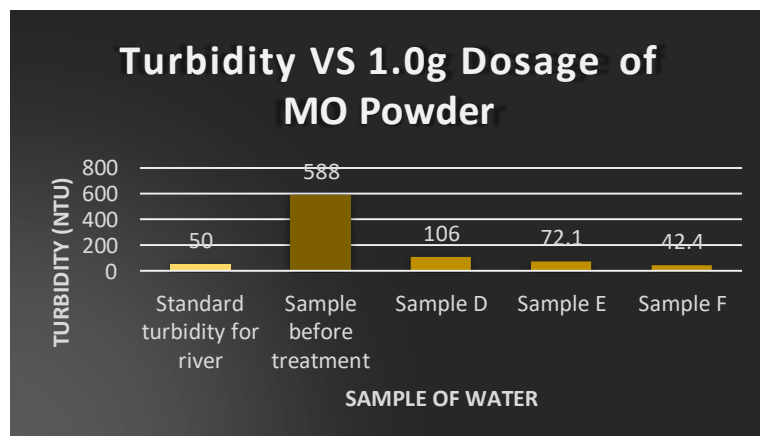


Figure 4.2: Turbidity value of water sample with 1.0 dosage Moringa Oleifera Powder

Findings 2

Table 4.3 : Result of pH with 0.5g and 1.0g dosage of Moringa Oleifera Powder

Sample	Settling Time By Moringa Oleifera (Hour)	Dosage Of Moringa Oleifera Powder (Gram)	pH before treatment	pH value with 0.5g dosage of Moringa Oleifera Powder	pH value with 1.0g dosage of Moringa Oleifera Powder
A	1	0.5	7.09	7.70	
B	2	0.5	7.09	7.57	
C	3	0.5	7.09	7.51	
D	1	1.0	7.09		7.41
E	2	1.0	7.09		7.37
F	3	1.0	7.09		7.23

Result pH and Turbidity obtain are acceptable referring to National Water Quality For Malaysia at **figure 4.3** is between range 6 – 9 .for the pH value of sample before and after treatment.and for turbidity value lower than 50 NTU. for both dosage Moringa Oleifera after 3 hour

PARAMETER	UNIT	CLASS					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6.5 - 8.5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/100 ml	10	100	400	5000 (20000)a	5000 (20000)a	-
Total Coliform	count/100 ml	100	5000	5000	50000	50000	> 50000

Notes

* = At hardness 50 mg/l CaCO₃

= Maximum (unbracketed) and 24-hour average (bracketed) concentrations

N = Free from visible film sheen, discolouration and deposits

Source : EQR2006

4.4

Figure 4.3: National water Quality Standards for Malaysia

CLASS	USES
Class I	Conservation of natural environment. Water Supply I - Practically no treatment necessary. Fishery I - Very sensitive aquatic species.
Class IIA	Water Supply II - Conventional treatment. Fishery II - Sensitive aquatic species.
Class IIB	Recreational use body contact.
Class III	Water Supply III - Extensive treatment required. Fishery III - Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

Source : EQR2006

Figure 4.4: Water Classes And Uses

In order to assess the water quality of Sungai Melaka for 3 hour using 0.5g and 1.0g Moringa Oleifera has been calculated which has been applied also for 3 sampling section each dosage. This result as below refer table 4.4.

Table 4.4: Result pH and Turbidity for water sample at Sungai Melaka

Sample	Settling Time By Moringa Oleifera (Hour)	Dosage Of Moringa Oleifera Powder (Gram)	pH before treatment (°C)	pH value with 0.5g dosge of Moringa Oleifera Powder	pH value with 1.0g dosge of Moringa Oleifera Powder	Turbidity before treatment (NTU)	Turbidity with 0.5g dosage of Moringa Oleifera Powder (NTU)	Turbidity with 1.0g dosage of Moringa Oleifera Powder (NTU)
A	1	0.5	7.09	7.70		588	47.2	
B	2	0.5	7.09	7.57		588	46.7	
C	3	0.5	7.09	7.51		588	38.6	
D	1	1.0	7.09		7.41	588		106.0
E	2	1.0	7.09		7.37	588		72.1
F	3	1.0	7.09		7.23	588		42.4

From the results obtained can be concluded the longer the time taken the better the results given and meet the National Water Quality Standards for Malaysia. Before determining the actual classification, it is necessary to meet some other testing needed. This sample of water from Sungai Melaka are classification in IIA or IIB if follow from this result.

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