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## Potential of Red Dragon Fruit Skin Waste (*Hylocereus Pyrhyzus*) As An Alternative Dyeing Substitute For Eosin In Coloring *Hookworm* Eggs

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### Abstract

The dragon fruit peel is waste, but it has many uses. The dragon fruit peel includes phenolics, phytoalbumin, alkaloids, terpenoids, flavonoids, thiamine, betalains, phenylpropanoids, triterpenes, sterols, and fatty acids. The pigment called betalain is responsible for the red hue of the skin of red dragon fruit. Reddish-violet-coloured betacyanin and yellow-coloured betaxanthin combine to form the nitrogen-containing pigment known as betalain. Using the native eosin reagent is the simplest method for examining *Hookworm* worm eggs. Since the eosin dye and the dye found in dragon fruit peel are similar, this study aims to determine whether the waste from dragon fruit peel could be used to examine *Hookworm* eggs instead of the more costly and challenging-to-get eosin reagent. This study aims to ascertain whether the waste from dragon fruit peels can be utilized in place of eosin when examining *Hookworm* eggs under a microscope. This study used a Completely Randomized Design (CRD). Along with comparing the efficacy of eosin dye and dragon fruit peel waste in the lengthy drying process, this study attempts to ascertain the potential of red dragon fruit peel waste (*Hylocereus polyrhizus*) as a substitute dye for eosin in *Hookworm* egg colouring. In addition to collecting stool samples in Gampong Jawa, Banda Aceh, This study was conducted at the Microbiology Laboratory, Department of Medical Laboratory Technology, Aceh Health Polytechnic, Ministry of Health. In this study, the juice from 100% dragon fruit peel waste was used in place of 2% eosin to observe *Hookworm* worm eggs under a microscope and compare the drying times of the reagent between eosin and dragon fruit peel waste. Proceed to observe after doing this three times. Then, the T-test was used to analyze the data. Compared to the eosin control reagent, which dries in just 7.34 minutes when used for worm egg staining, dragon fruit peel waste has an average drying time of 9.21 minutes, making it a viable substitute reagent for examining hookworm eggs. Waste from dragon fruit peels can be used as a substitute reagent when analyzing hookworm eggs. There was a noticeable difference in drying times between the treatment of waste from dragon fruit peel and the eosin control.

**Keywords:** *Hylocereus polyrhizus* peel waste juice, eosin, *Hookworm*

### Introduction

Due to its location in a tropical region with a stable climate, Indonesia boasts a high level of biodiversity [1]. According to National Geographic Indonesia (2019), mainland biodiversity in Indonesia ranks second only to Brazil [2]. A component of Indonesia's biodiversity is the red dragon fruit (*Hylocereus polyrhizus*). With its edible fruit, red dragon fruit (*Hylocereus polyrhizus*) is a kind of cactus plant that has much potential as an ornamental plant [3]. The

results of processing red dragon fruit include juice, jam, and other products, with dragon fruit skin as a by-product [4]. Despite being wasted, the peel of dragon fruit has numerous advantages [5]. Betalain is a pigment that gives the skin of red dragon fruit its red hue. Nitrogen-containing pigment betalain comprises betacyanin, which has a reddish-violet hue, and betaxanthin, which has a yellow hue [6]. The most straightforward native method for examining nematode worm eggs in the intestine is to use an eosin reagent, which is reddish-orange in colour and acidic. The idea behind using 2% eosin is to make it easy to identify worm eggs from another excrement that is nearby.

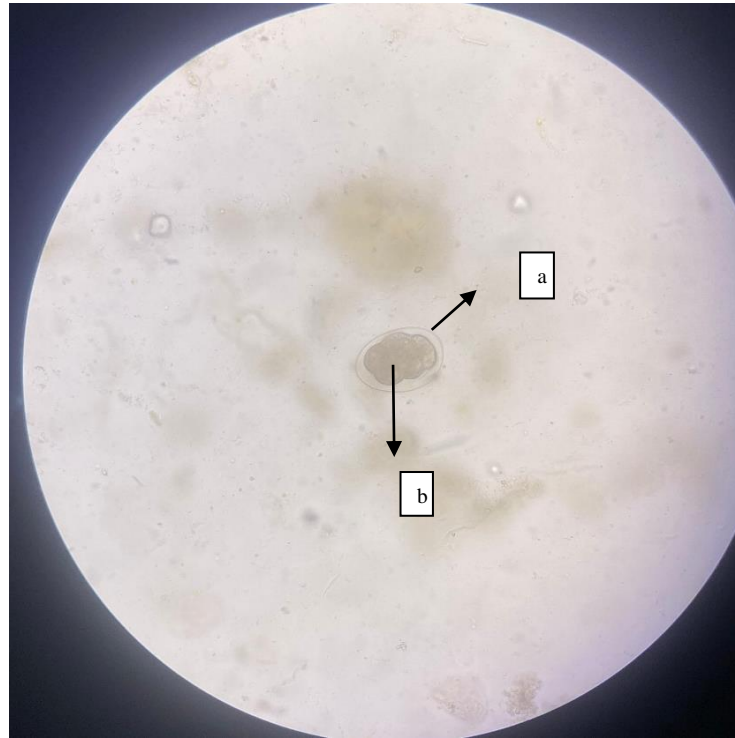
## Materials & Methods

This quasi-experimental research uses a Completely Randomized Design (CRD) research methodology. This study compared the background dye used to prepare Soil Transmitted Helminth (STH) worm eggs between the leftover dragon fruit peel juice and the eosin reagent. This study compares the effectiveness of eosin reagents and waste juice from dragon fruit peels over an extended drying period. This study was conducted in the Microbiology Laboratory, Technology Department, Medical Laboratory, Health Polytechnic, Ministry of Health, Aceh. Gampong Jawa, Banda Aceh, is where faeces samples are collected. This study employed the following tools: a microscope, cover glass, object glass, mortar, pestle, dropper pipette, measuring pipette, beaker and 25 ml measuring flask, scales, stopwatch, mask, lab coat, flannel cloth, paper lens, tissue, distilled water, Whatman filter paper, and marker. Eosin, formalin, ether, 70% and 96% alcohol, and juice from leftover dragon fruit peels were the reagents used.

Examining *Hookworm* eggs involves preparing 100% concentrated juice from dragon fruit peel waste as an alternative to 2% eosin. Repeat the process three more times to compare the drying times of the reagent between 2% eosin and the feeling of leftover dragon fruit peel waste. With 2% eosin control and 100% juice from dragon fruit peel waste, the first parameter examined in this study was the microscopic observation of *Hookworm* worm eggs. The second parameter is the ratio of the drying time for the preparation of the *Hookworm* eggs between the 2% eosin control and 100% juice from dragon fruit peel waste. Background data on worm egg colouring preparations was gathered using photographic images. The data about how long it takes for the preparation to dry is then statistically analyzed using the T-test.

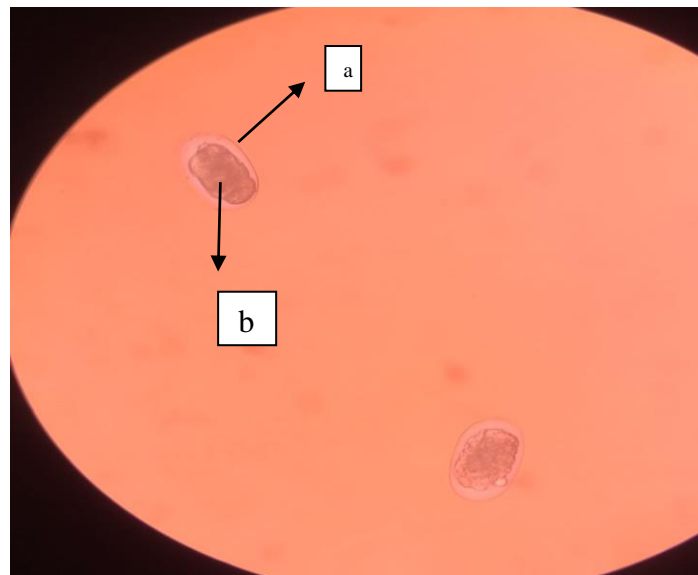
## Result

Figure 1 displays the findings from the investigation into using the waste juice from dragon fruit peels as a background when examining *Hookworm* eggs.



**Figure 1.** *Hookworm* eggs using juice from dragon fruit peel waste (a) *Hookworm* egg shell (b) *Hookworm* egg contents

Figure 1 illustrates how colouring *Hookworm* eggs with fresh water made from leftover dragon fruit peel waste reveals the eggs' morphology, including the eggshell and its contents. Results from Applying Eosin as a Control for *Soil Transmitted Helminth* (STH) WormEggs. The following figure shows the investigation's findings into the background used for STH examinations using 2% eosin as a control.



**Figure 2** 2% eosin control contains (a) *Hookworm* egg shell (b) *Hookworm* egg contents

Table 1 displays the findings of measuring the average drying time of waste juice from dragon fruit peels and 2% eosin control.

**Table 1.** The average drying results were 100% juice from dragon fruit peel waste and 2% eosin in staining worm egg preparations.

Sample	Repetition I		Repetition II		Repetition III	
	Eosin	Peel Dragon Fruit Waste	Eosin	Peel Dragon Fruit Waste	Eosin	Peel Dragon Fruit Waste
1	07.55	09.59	07.28	09.19	07.51	09.04
2	07.41	09.03	07.43	09.05	07.18	09.01
3	07.53	09.06	07.34	09.05	07.10	09.03
4	07.18	09.06	07.23	09.07	07.21	09.12
5	07.27	09.15	07.30	09.16	07.43	09.40
6	07.46	09.20	07.43	09.30	07.36	09.29
7	07.42	09.31	07.45	09.32	07.14	09.04
8	07.12	09.11	07.20	09.06	07.30	09.07
9	07.40	09.10	07.43	09.11	07.36	09.15

10	07.38	09.16	07.39	09.17	07.53	09.20
Average (minute/ second)	07.33	09.18	07.35	09.15	07.31	09.13

### Results of the average drying time between reagents

Table 2 displays the findings of the investigation of variations in drying times in *Soil Hookworm* egg preparations using natural reagents from juice from dragon fruit peel waste and eosin control.

**Table 2.** Results of average drying time between reagents.

No	Reagent	N	Average (minutes)	Standard Deviation	P Value
1	Peel Dragon Fruit Waste	10	9,2	0,12	0,00
2	Kontrol eosin	10	7,3	0,08	

Table 2 shows that the average drying time for stool preparations made with leftover dragon fruit peel waste is 9 minutes and 2 seconds, which is longer than the eosin control's average drying time of 7 minutes and 3 seconds. Based on the T-test results, the drying time difference between the eosin control and the juice from dragon fruit peel waste was  $0.00 > \alpha$  value 0.05, indicating a significant difference between treatments.

### Discussion

Examining *Hookworm* eggs using leftover red dragon fruit skins may be possible. This conclusion is supported by Figure 4.4, which displays the *Hookworm* eggs along with their contents and eggshells clearly and visibly. Dragon fruit skin waste, typically thrown away, can be utilized to check worm eggs. Waste from red dragon fruit skin is beneficial in this regard.

Despite being wasted, dragon fruit peel has many advantages [5]. The peel of dragon fruit has been found to include phenolics, phytoalbumin, alkaloids, terpenoids, flavonoids, thiamine, betalains, phenylpropanoids, triterpenes, sterols, and fatty acids [7]. The pigment called betalain is responsible for the red hue of the skin of red dragon fruit. The nitrogen-containing pigment known as betalain comprises two colours: yellow-coloured betaxanthin and reddish-violet-coloured betacyanin [6].

Water-soluble natural pigments called betalains, also referred to as chromo alkaloids, are unique (secondary) nitrogen-containing metabolites. The two main structural groups that make up this pigment are betaxanthins, which have an orange-yellow colour, and betacyanins, which have a reddish-purple colour [8]

## Conclusion

The difference in the average drying time for the reagent using natural reagents: the extract of red bougainvillea flowers is 23.96 minutes, the extract of pink bougainvillea flowers is 23.30 minutes, and the extract of orange bougainvillea flowers has a longer time, namely 28.40 minutes when compared with the eosin control reagent which had a drying time of 27.63 minutes on *Soil-Transmitted Helminth* egg preparations. The drying time of the reagent between the results of the ANOVA test on the drying time of red, pink, and orange bougainvillea flower extract and the control eosin showed a value of  $0.192 >$  an alpha value of 0.05, indicating that there was a significant difference in the amount of drying time in each treatment. According to Table 4.2, eosin, the control reagent, takes longer on average to dry than the natural reagents made from red, pink, and orange bougainvillea flower extract.

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