



EXTRACTION OF PINEAPPLE LEAF FIBRE: JOSAPINE AND MORIS

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ABSTRACT

Natural fiber especially pineapple leaf fiber (PALF) has so much to offer in the uprising world of industry. Hence tests have been carried out on two most common types of pineapple planted in Malaysia, which are Josapine and Moris. Josapine shows a better quality in terms of taste, leaf size and even easier to be extracted whilst maintaining good quality of fiber. Hence, more tests should be done to improve the quality of pineapple leaf fiber.

Keywords: extract, fibre, pineapple leaves, josapine, moris.

INTRODUCTION

Pineapple is the second highest tropical fruit commercially produced in the world, around 25.1 million metric tonnes. Malaysia being part of 3.3% or 448,193 metric tonnes of the production, has the capability to become the better at producing more pineapple in the future (Hamid & Kassim, 2013). In Malaysia especially, two types of pineapple are famous for plantation are Josapine (acronym for Johor-Sarawak-Pineapple) and Moris, which also known as Mauritius. These two types of pineapple leaves show different physical characteristic traits from each other. Josapine is long and has more width than Moris. Meanwhile Moris is thornier and the fruit is cheaper than Josapine. Nonetheless, with the rising of pineapple plantation across the world, the pineapple leaf fibers are also being utilized for many purposes in different sectors of industries (Dittenber & GangaRao, 2012). Hence several experiments have been conducted to determine which type of pineapple leaf is in general, better to be utilized as fiber.

PINEAPPLE LEAF FIBER

Pineapple leaf fiber is one kind of fiber derived from plants (vegetable fiber) which is derived from the leaves of the pineapple plant. Pineapple which also has another name, that *CosmosusAnanas*, (including the family Bromeliaceae), in general this is a crop plant season (Doraiswamy, 1993). Historically, this plant comes from Brazilian and brought to Indonesia by the Spanish and Portuguese sailors around 1599.

The pineapple leaf shape resembles a sword that taper at the ends with black and green colors on the edges of the leaves are sharp thorns. Depending on the species or type of plant, pineapple leaf length is between 55cm to 75cm by 3.1cm to 5.3 cm wide and 0.18cm thick leaves of up to 0.27cm. In addition pineapple species, spacing and distribution of sunlight will affect the growth of leaf length and strength properties of the resulting fiber. Distribution of sunlight is not too much (partly hidden) generally will produce a strong fiber, refined, and similar to silk.

Pineapple leaf fiber intake is generally done at the age of 1 to 1.5 years. A fiber derived from the leaves of the young pineapple generally is not long and strong. For fiber produced from pineapple that is too old, exposed to sunlight without protection will produce short fibers, coarse, and brittle. Therefore, to obtain a strong fiber, soft and smooth, the selection should be done in pineapple leaves enough and protected from the sun (Pandey, 2005).

PINEAPPLE LEAF EXTRACTOR

Separation process or pineapple fiber from the leaves can be done in two ways, namely the manual and mechanical methods. The most common and effective is the manual method, the process is done by immersion. In this process, micro-organisms play an important role to separate or remove Gummy substance which surrounds the pineapple leaves and this process will cause fiber and decompose easily separated from each other (P Hidayat., 2008). This process is done by soaking the leaves of the pineapple into the water in a certain period of time such as a week. The next process is the process of using a plate shown in Figure-1 or whittle with no sharp knife to remove the skin leaves still attached to the fiber surface shown in Figure-2. After that, the fiber is washed with water and dried under the sun or using the oven.



Figure-1. Process using a plate (Remedios, 2007).



Figure-2. Taking out the fiber (Remedios, 2007).

TEST METHOD

Both Josapine and Moris were extracted by using an extractor machine called Pinapple Leaf Fiber Machine 1 (PALF M1) and then were dried under the sun for two days (Adam, Yusof, & Yahya, 2014). There are three states where for the fibers are known in the test, mainly wet fiber, dried fiber and usable fiber. Wet fiber is when the fiber is freshly extracted from original leaf which still contains a lot of moisture, hence the name, wet fiber. While, dried fiber is when the fiber is dried at certain temperature after its wet state and usable fiber is the total weight of dried fiber divided by the weight of the original leaf.

The first test is basically determining the average weight of both types of leaves to identify which type is heavier and bigger. Next, the treatment test was carried out to know whether with certain chemicals, it might speed up

the extraction process or even reducing damage to the fiber afterwards (Haynes, 1934).

A chemical have been selected, which was sodium bicarbonate and hot water (100 degree Celsius) was also included in the test. For the test to be success, 200 pieces for every each type of pineapple leaf which was separated by their respective months old (5 and 8). Then the leaves will be soaked for at least 5 minutes before going through the PALF M1.

Water content for a fresh pineapple leaf would weigh around 80% of the leaf. The fiber yield percentage from the calculation can be obtained by this equation;

Fiber yield (%) =

$$\left[\frac{\text{Weight of dry PALF (g)}}{\text{Weight of fresh pineapple leaves (g)}} \right] \times 100 \text{ (5.1)}$$

Hence, the fiber yield projected from this equation will determine the efficiency of methods used to extract the leaf fiber.

JOSAPINE AND MORIS ANALYSIS

Several repeating tests have been carried out to get the result for weight difference between Josapine and Moris. Figure-3 shows the average weight for leaves before the extraction process between two types of leaves, Josapine and Moris. The average weight for the 5 months Josapine and Moris are 42.75g and 35.58g respectively, while for the 8 months are 43.87g and 35.81g respectively. The result from this test shows that Josapine leaves are generally heavier and bigger than Moris leaves.

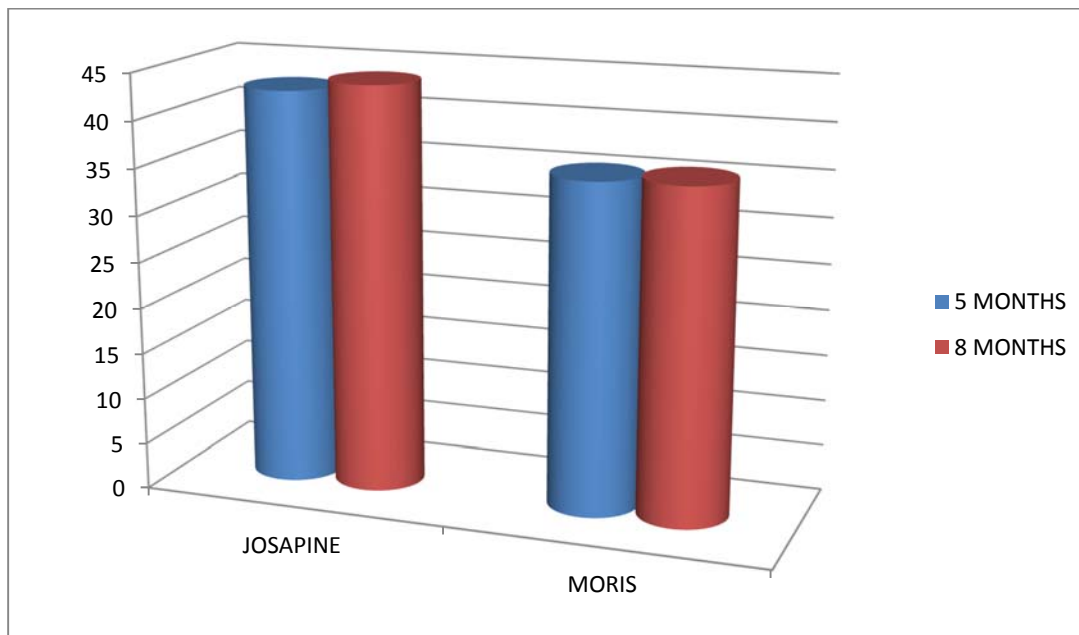


Figure-3. Average weight for pineapple leaves (g).



After done with weighing process, the selected leaves were then extracted and dried and the results for the treatment test were shown in Figures 4, 5 and 6.

As shown from Figure-4, 5 month Josapine has higher percentage of dried fiber with 82% compared to 5 month Moris with only 68%. The same result also happened with the 5 month leaves that were treated with hot water, giving the result of 74% and 56% for Josapine

and Moris respectively. However, result for leaves that were treated with sodium bicarbonate differs with Moris having more percentage of dried fiber, 71% compared to 65% for Josapine. Meanwhile, for 8 months leaves, Josapine has outdone Moris in every test with the result for no treatment, hot water treatment and sodium bicarbonate are 74%, 71% and 80% while Moris only 73%, 67% and 78%, respectively.

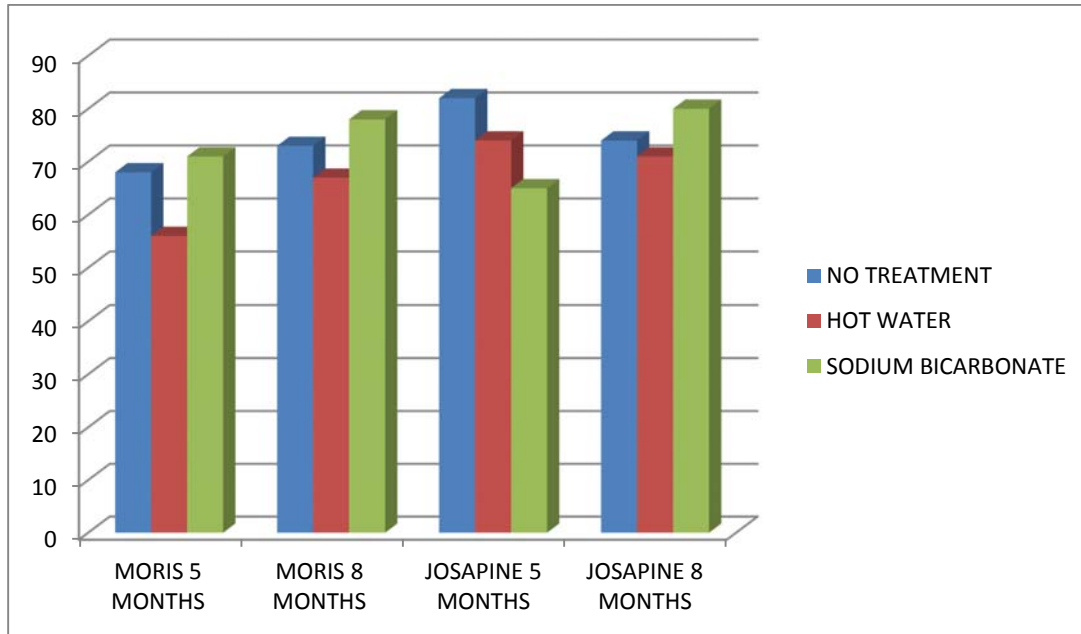


Figure-4. Percentage of dried fiber yield from scrapped leaf using PALF M1 (%).

As for Figure-5, for 5 month leaves for both Moris and Josapine, the results are 20.44% and 20.29% for no treatment, 21.92% and 24.24% for hot water treatment while 20.48% and 21.29% for sodium bicarbonate

respectively. For 8 months old Moris and Josapine, results for no treatment are 17.43% and 21.38%, for hot water are 20.33% and 18.09%, while for sodium bicarbonate are 23.57% and 21.28% respectively for each tests.

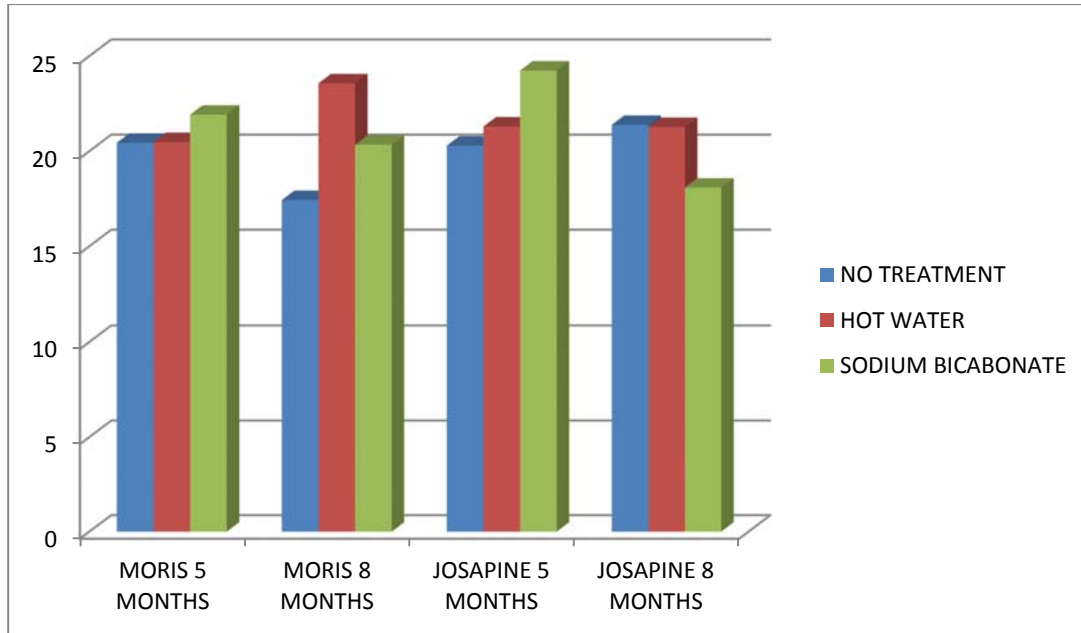


Figure-5. Percentage of wet fiber yield from scrapped leaf using PALF M1 (%).

Meanwhile, for Figure-5, the result for 5 month Moris and Josapine are 13.92% and 16.74% for no treatment, 12.33% and 18.01% for hot water treatment, while 14.69% and 13.90% for sodium bicarbonate. As for

the 8 month, 12.77% and 15.91% for no treatment, 12.75% and 12.85% for hot water treatment while 18.56% and 17.21% for sodium bicarbonate.

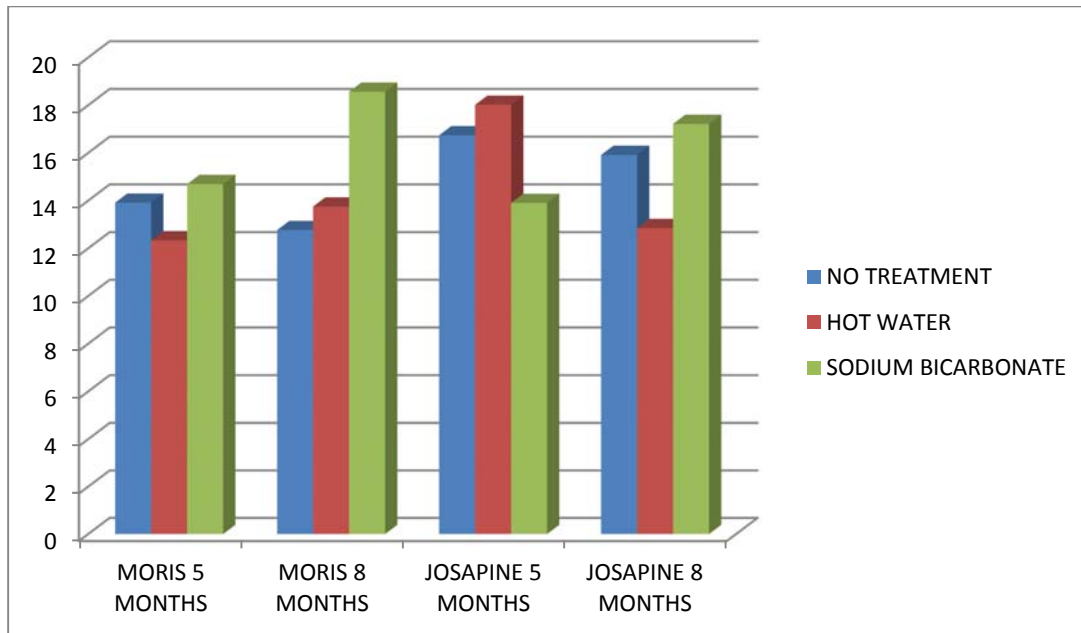


Figure-6. Percentage of usable fiber yield from scrapped leaf using PALF M1 (%).



CONCLUSIONS

With the rising of pineapple leaf fiber usage and needs across the globe, it is imperative to determine which type of pineapple leaf is more suitable for the industry. Hence, from the tests and analysis, it can be said that, Josapine is a more suited type of pineapple to be grown for fiber production since it is easier to be handled, extracted and has more fiber in a single leaf compared to Moris. Furthermore, with the Josapine fruit price is higher than Moris, there is no doubt, it should be the superior selection for pineapple plantation.

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