

## TESTING THE EFFECTIVENESS OF SOURSOP AND SAPAT LEAF INHIBITORS IN THE PRODUCTION OF RED SUGAR

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### ABSTRAK

Tumbuhan aren memiliki potensi besar untuk dikembangkan sebagai komoditas tanaman perkebunan unggul. Memiliki banyak kegunaan aren dapat menghasilkan berbagai manfaat bagi masyarakat. Saat ini, keterbatasan pengetahuan dan keterampilan dalam mengelola aren, menyebabkan rendahnya kadar ke higienisan aren yang dihasilkan khususnya dalam menghasilkan air nira. Rata-rata petani aren menggunakan bahan pengawet yang berlebihan sebagai bahan campuran guna meningkatkan rendemen pada air nira. Sehingga menimbulkan efek yang dapat berbahaya bagi kesehatan. Oleh karena itu, dibutuhkan tambahan bahan alami yang bersifat dapat menghambat keasaman pada air nira. Salah satu bahan alami yang dapat digunakan yaitu daun sirsak dan daun sapat. Adapun tujuan dari kegiatan penelitian ini yaitu mengetahui efektivitas daun sirsak dan safat dalam menghambat kadar asam pada air nira pada konsentrasi yang tepat. Rancangan Percobaan yang digunakan yaitu Rancangan Acak Lengkap (RAL) dengan 2 faktor yaitu jenis tumbuhan penghambat (daun sirsak dan daun sapat) dan konsentrasi (0 ml, 25 ml, 50 ml, 75 ml, dan 100 ml) yang diberikan. Parameter yang diamati yaitu pH dan waktu. Hasil penelitian menunjukkan bahwa perlakuan pemberian daun ekstrak daun sapat dengan konsentrasi 100 ml dapat menghambat keasaman pada air nira.

*Kata kunci : konsentrasi, nira, sapat, sirsak.*

### ABSTRACT

Sugar palm plants have great potential to be developed as superior plantation commodities. Having many uses of aren can produce various benefits for society. At present, the limited knowledge and skills in managing aren produce low levels of hygiene, especially in producing sap water. On average, palm farmers use excessive preservatives as a mixture to increase the yield of sap water. Thus causing effects that can be harmful to health. Therefore, additional natural ingredients are needed which can inhibit the acidity of the sap water. One of the natural ingredients that can be used are soursop leaves and sapat leaves. The purpose of this research activity is to determine the effectiveness of soursop and safat leaves in inhibiting acid levels in sap water at the right concentration. The experimental design used was a completely randomized design (CRD) with 2 factors, namely the type of inhibiting plants (soursop leaves and sapat leaves) and the concentration (0 ml, 25 ml, 50 ml, 75 ml and 100 ml) given. Parameters observed were pH and time. The results showed that the treatment of sapat leaf extract with a concentration of 100 ml could inhibit the acidity of the sap water.

*Keywords: concentration, sap, sapat, soursop.*

## INTRODUCTION

Sugar palm plant is a type of plant that has the potential to be cultivated, sugar palm is a versatile plant that has long been known to produce many benefits. Almost all the physical and production parts of this plant can be utilized and have economic value. The use of aren can be felt directly by the community both in and around the forest through traditional use. Palm sugar can be used as a sap-producing plant, a source of carbohydrates, a mixture of food and drinks (and fro), building materials and as a conservation plant for degraded lands (Ferita et al., 2015).

Palm sugar is a product derived from the palm plant. Palm sugar has its own characteristics when compared to sugar from other sources. The peculiarities of this product include, it is more soluble, it is dry and clean and has a distinctive aroma. This uniqueness causes palm sugar to be widely used to make cakes, soy sauce and other food products (Aliudin, 2010).

The limited knowledge and low level of education of sugar artisans has resulted in the lack of attention given to hygiene level sanitation from tapping to product packaging. Likewise, adding preservatives is often excessive and there is a chance to add mixed ingredients to increase the yield. The use of dangerous chemical additives in the manufacture of brown sugar, is detergent powder. The use of preservatives from hazardous chemicals in food is a serious problem. Food control data from Balai Besar (BPOM) throughout Indonesia shows that the trend of misuse of some prohibited chemicals for food, such as formaldehyde as a food preservative, continues to this day (Widiastuti, 2015).

Research conducted by Artini (2012), states that soursop leaves contain active isolates that are antioxidants. Based on the results of phytochemical tests stated that soursop leaves proved to contain saponins, tannins, flavonoids and glycosides which act as antioxidants. Phenol content, antioxidant activity and antibacterial activity were also found in the leaves of *Macaranga gigantea*, *M. hosei*, *M. hypoleuca*, *M. kingii*, *M. pruinosa* and *M. triloba* (Lim et.al., 2014).

Palm sap is a liquid that is tapped from the male flowers of the palm tree. This liquid contains between 10-15% sugar. Palm trees have male flowers and female flowers. The sap of both flowers can be tapped. Male flowers are flowers that are always tapped because the quantity and quality of the results are more satisfying than female flowers. Length is about 50 cm. While the female flowers reach 175 cm. Male flowers can be tapped when they have released stamens (Setiawan, 2012).

Male flowers can produce more sap than female flowers because male flowers are elliptical like bullets that reach 1.2-1.5 cm in length, are in strands/groups and are purple in color while female flowers are small round in shape, live separately and greenish white, so that the female flowers are developed into fruit or what is commonly called kolang kaling (Srena, 2018).

Soursop leaves contain the compounds acetogenin, annocatacin, annocatalin, annohexocin, annonacin, annomuricin, anomurine, anonol, caclourine, gentisicacid, gigantetronin, linoleic acid and muricapentocin (Widyaningrum, 2012).

## RESEARCH METHODS

**Time and Location of Research:**The research was conducted in June 2021. The research location was located in Sindang Jati Village, Sindang Kelingi District, Rejang Lebong Regency. The altitude of the research location is 939 meters above sea level. And the materials used are sap water, soursop leaf extract and sapat leaf extract.

### Research Stages

Preparation of extraction of Soursop Leaves and Sapat Leaves

Preparation was carried out by looking for 2 types of plants used as acidity inhibitors in sap water. Then extract soursop leaves and sapat leaves/fruit which are thought to be acidity inhibitors in sap water. The process of making soursop and sapat leaf extracts is by grinding them using a blender and then squeezing and extracting the extracts from the two types of plants.

#### 1. Preparation of sap water

Water sap as the main ingredient which is the main material for research by taking sap water from palm trees.

#### 2. Nira water distribution

The sap water that had been taken from the palm tree was then divided into 9 samples, each sample containing 100 ml of sap water.

#### 3. Mixing sap and inhibitor water

The sap water that has been divided into 100 ml is then mixed with the extracts of the 2 types of plants that have been prepared.

#### 4. Measurement of the acid content of sap water

Measurement of acid levels was carried out 6 hours after mixing the sap water and extracts of 2 plant species.

## Research variable

### a. pH

pH is the degree of acidity used to express the level of acidity or alkalinity possessed by a solution. pH measurements using a pH meter were used before and after administration of soursop leaf extract and sapat leaf extract.

### b. Color

Color is a certain spectrum contained in a perfect light (clear white). Observations of color changes can be seen directly without using microscopic equipment.

## Data Presentation

Data analysis is done by analyzing the data obtained from the research, the results of which are qualitative data in numerical form and then presented in tabular form.

- To the south it is bordered by Air Lang Village
- To the east it is bordered by Belitar Seberang Village
- To the west it is bordered by Sindang Jaya Village

Geographically, Sindang Jati Village is located at 3°29'34.5"S south latitude and 102°Longitude 41'45.6"E east. Sindang Jati Village has a hilly topography with many slopes, at an altitude of around 939 meters above sea level. The temperature in Sindang Jati Village has a climate between

## RESULTS AND DISCUSSION

### Geographical location

Sindang Jati Village is one of the villages located in Sindang Kelingi District, Rejang Lebong Regency. Sindang Jati Village is located 36 km or ± 1 hour from the center of the Capital City of Rejang Lebong Regency.

The boundaries of the Sindang Jati Village area are as follows:

- To the north it is bordered by Cold Water Village

23.7°C-28.8°C with humidity around 81.21%, with a total of 3 dry months, 9 wet months. The average rainfall is 233mm/month, so it is very suitable for animal husbandry because there is a lot of elephant grass as animal feed. Sindang Jati Village has a land area or area of +\_ 243 hectares.

**Changes in Quality of Palm Nira During Storage by Giving Soursop Leaves and Sapat Leaves.**

1. Pure Nira Water pH Value Test

**Table 1.** pH Value of Nira Aren Water Pure During Storage.

Sapat leaf extract dosage	Pure sap water	Acid level during storage (pH)				
		0 jam	6 jam	12 jam	18 jam	24 jam
Ml	Ml					
25 ml	100 ml	4,8	4,3	4,3	4,2	3,2
50 ml	100 ml	4,8	4,4	4,3	4,3	4,3
75 ml	100 ml	4,8	4,5	4,4	4,4	4,4
100 ml	100 ml	4,8	4,6	4,4	4,4	4,4

**Table 2.** pH Value of Nira Aren Water After Adding Soursop Leaf Extract During Storage.

Pure sap water	Acid level during storage (pH)				
	0 jam	6 jam	12 jam	18 jam	24 jam
Ml					
100 ml	4,8	4,5	4,3	4,0	3,8

Based on Tables 1 and 2, it can be seen that the decrease in pH value appears to be significant compared to Table 2 after administration of soursop and sapat leaf extracts. This may be because soursop leaves and sapat leaves are one type of inhibitor substance that can inhibit fermentation in pure sap water. If the sap is in acidic conditions with a pH below 6 then the sap will quickly undergo a fermentation process. Materials containing tannins can be used to inhibit the fermentation process in the sap. According to Isma, (2013), tannins are astringent plants with a distinctive astringent taste. Scientifically, tannins are called

polyphenolic compounds which have high molecular weight and hydroxyl groups and carboxyl groups which can form complexes with proteins and other macromolecules in certain environments and conditions.

**Table 3.** The pH value of palm sap water after administration of sapat leaf extract during storage.

Dosage of soursop leaf extract	Pure sap water	Acid level during storage time (pH)				
		0 jam	6 jam	12 jam	18 jam	24 jam
Ml	Ml					
25 ml	100 ml	4,8	4,3	4,3	4,0	3,9
50 ml	100 ml	4,8	4,4	4,3	4,1	4,0
75 ml	100 ml	4,8	4,5	4,4	4,2	4,1
100 ml	100 ml	4,8	4,6	4,4	4,3	4,2

Based on Table 3, samples of palm sap that had been treated with Sapat Leaf preservative were then analyzed at 0 hours to determine the quality of the palm sap. The quality of palm sap in terms of pH value, the initial pH of fresh sap is 4.8. Then after 6 hours the addition of Sapat Leaf Extract at a concentration of 25 ml pH 4.3, 50 ml pH 4.4, 75 ml pH 4.5 and 100 ml pH 4.6. After 12 hours of adding Sapat Leaf Extract, at a concentration of 25 ml, the pH of Nira Water remained 4.3. At a concentration of 50 ml, the pH of Nira water decreased to 4.3, at a concentration of 75 ml, the pH of Nira water decreased to 4.4, while at a concentration of 100 ml, the pH of Nira water was also 4.4. After 18 hours of

adding Sapat Leaf extract at a concentration of 25 ml the pH became 4.2, at a concentration of 50 ml the pH remained 4.3, at a concentration of 75 ml and 100 ml the pH remained at 4.4. After 24 hours of adding sapat leaf extract at each concentration, the pH remained the same as after adding the extract at 18 hours.

This is due to the ethanol-water fraction containing alkaloid and phenolic compounds. Compounds that have potential as antioxidants are generally flavonoids, phenolics, and alkaloids. Flavonoid and polyphenolic compounds are antioxidant, antidiabetic, anticancer, antiseptic and anti-inflammatory, while alkaloids have antineoplastic properties which are also effective in inhibiting the growth of cancer cells. Phenol content, antioxidant activity and antibacterial activity were also found in the leaves *Macaranga gigantea*, *M. hosei*, *M. hypoleuca*, *M. kingii*, *M. pruinosa* and *M. triloba* (Lim *et.al.*, 2014). This leads to the notion that mahang leaves obtained and collected from the local area where this research was conducted also have similar properties and activities.

#### **Changes in Nira Water Color After Administration of Soursop Leaves and Sapat Leaf Inhibitors**

The color of the sap that has just been tapped is clear white and fresh palm sap tastes sweet, has a distinct sap smell. After 6 hours of storage, the color starts to change to cloudy white. So the longer the storage, the more pale white and smells bad, the taste is getting sour according to the length of storage and there is sediment underneath. This is because the sap water has undergone fermentation or the process of decomposition of organic compounds to produce energy and the conversion of the substrate into new products by microbes. (Blitz, 2017).

Nira water that has been added with soursop leaf extract has a distinctive smell of soursop leaves, has a slightly

yellowish green color and the color becomes darker green when more and more soursop leaf extract is added and there is a little sediment underneath. Meanwhile, sap water that has been added with sapat leaf extract has a distinctive odor of sapat leaves, which is slightly pungent, slightly brownish green in color and the color will get browner according to the amount of addition of sapat leaf extract and has sediment underneath.

#### **Discussion**

From a sample of 100 ml of pure palm sap water, it changes according to the length of storage time with a variation of 6 hours difference. The initial pH in 100 ml of pure sap water is 4.8, after 6 hours the pH drops to 4.5, after 12 hours of storage the pH drops again to 4.3, storage of sap water for 18 hours the pH becomes 4.0 and storage for 24 hours the pH of pure sap water decreased to 3.8.

From a sample of 100 ml of sap water mixed with soursop leaf extract, changes in the pH of the sap water during 24 hours of storage showed a slightly better decrease in pH compared to storage of pure sap water. With an initial pH of 4.8 after being stored for 6 hours, the pH changed to 4.6, at 12 hours of storage the pH became 4.4, 18 hours of storage the pH became 4.3, and at 24 hours of storage, the pH became 4,3.

From a sample of 100 ml of sap water mixed with sapat leaf extract, the pH results were better than the pH results from pure sap water and mixed with soursop leaf extract. The initial storage pH was 4.8, after 6 hours of storage the pH changed to 4.6, 12 to 24 hours of storage showed a pH of 4.4.

Sapat Leaf Extract is more effective in inhibiting the acidity of Nira Water, because Sapat Leaves contain tannins which are active compounds of secondary metabolites that function as antioxidants. Based on the research conducted by the researchers, it can be concluded that sapat leaves are the most

effective natural preservative to inhibit

### Conclusion

1. Sapat Leaf Extract is more effective in inhibiting the acidity of Nira Water, because Sapat Leaves contain tannins which are active compounds of secondary metabolites that function as antioxidants.
2. The higher the concentration of the extract given to Nira Water, the higher the pH value and the more effective it is in inhibiting the acidity of Nira Water.

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acidity in sap water.

### Suggestion

In this study the authors suggest to Aren Farmers to use natural preservatives, namely sapat leaf extract as a substitute for chemical preservatives to inhibit the acidity of sap water, because natural preservatives do not contain residues or substances that are harmful to health and cause various diseases.

food additives.  
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