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IDENTIFICATION OF STARCH FORMS IN EDIBLE PLANTS

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ABSTRACT

This study aims to identify the forms of starch in edible plants. This research involved several edible plants such as sago, yam and taro. This type of research uses descriptive quantitative methods by conducting experiments on each sample used. The data collection technique was carried out by describing the results of the starch form from each sample that had been obtained. The results obtained from this study showed that the Sago preparations viewed under a microscope had an oval starch shape and spread throughout the preparation so that it was classified as an eccentric starch type that could be seen at 10X magnification, while Jicama starch preparations had a round starch shape and chains in some parts. The plane of the preparation and entered in the concentric type, but the shape of starch in Jicama can be seen under a microscope at 100X magnification, the Taro preparation has a round and lumpy shape but the starch accumulates in several areas of the preparation and enters the concentric type seen at 40X magnification. So it can be concluded that the forms of starch in edible plants are very diverse, both in round to oval shapes, with smooth and rough starch structures, namely in the form of lumps.

Keywords: Edible Plants, Starch Form, Identification.

INTRODUCTION

Edible plants as fruit, tubers, or stems. There are many types of food-producing plants. Plant species as food sources must be managed effectively for Indonesia's food self-sufficiency [1].

In Indonesia's forests, there is little knowledge of edible plants. Plants that have organs or parts that can be consumed can be processed or eaten by humans because they provide good nutrition and are not harmful [2].

Edible coating is a thin layer of consumables that is placed directly on food products to prevent mass transfer of water vapor, O_2, and CO_2. Edible coatings produced from polysaccharides are applied to fruits and vegetables because they can exchange O_2 and CO_2 gases selectively. Respiration of fruits and vegetables can extend shelf life [3] [4]. Humans need food to survive. Carbohydrates are one of the body's main sources of energy. Lakitan (2000) said plants store carbohydrates as starch. Starch is made repeatedly using glucose from sugar. Starch is a product of photosynthesis that is preserved in tubers, stems, and seeds, according to Gunawan (2004). Starch is a carbohydrate found in tubers, leaves, stems, and seeds [5].

Starch is a plant chemical. Green leaves store the products of photosynthesis as starch. Starch is preserved in seeds, core fingers, bark, perennial roots, and tubers. Wheat germ has 50-65% starch while potato tubers have 80%. [6].

Hidayat (1995) said that plant taxonomy can use the form of starch. The basic forms of starch are glucose ($C_6H_{12}O_6$) and D-glucose. Acid hydrolyzes starch to glucose.

Hydrolysis can also be carried out with the enzyme amylase. In saliva and pancreatic juice, amylase acts on the starch in our food, converting it to maltose [7]. Based on the hilum position, starch is concentric or eccentric. Concentric starch has a middle hilum, while eccentric starch has a peripheral hilum. Circular concentric starch; oval-shaped eccentric starch [8]. Starch can be produced from amylopectin and amylose. Amylopectin is a branched glucose polymer. Some plants have only one hilum (monoadelph), while others have a semi-compound hilum (two hilums bounded by lamellae).

Some edible plants have a variable hilar shape, such as taro, which has a cracked hilus with a lamella in the middle. The starch granules of each plant are arranged and shaped differently. It's round and oval. The starting point of flour grain production (hilus) affects the morphology of starch grains. Hilus counting, there are three types. The

hilum may be one (monoadelphin), two (diadelphin or semi-compound), or several (multiadelphin) (polyadelphin or compound) [9].

Plants can be identified based on the type of starch. This is reinforced by the type of starch found in edible plants; The starch in this plant can increase the resistance of living things that ingest it. Taro, sweet potato, sago and other crops grow here. Richana and Suharti (2004) said starch grains were only used to differentiate tubers. Starch grains have different shapes based on the location of the hilus and the surrounding lamellae [10].

METHODS

Experimental research is used. Experimental research with the most thorough quantitative approach to examine causal relationships [10]. Experimental research methods were used to test therapy under controlled conditions. Experiments will reveal the types and forms of starch in edible plants.

Observations of starch forms were carried out at the Botanical Laboratory of the Faculty of Teacher Training and Education, Samudra Langsa University from April to May 2022.

Procedure

a. Sampling

The samples taken were taro, yam and sago which were old and ready to be harvested. Preparation of Preparations and Sampling: (1) Prepare the necessary tools and materials; (2) Measure 200 grams of taro, yam, and sago for each component; (3) Puree the ingredients and let it soak for about a day; (4) Strain the mixture using a filter cloth and transfer to a basin; (5) Wait ten minutes before removing the filter; (6) Put the precipitate into a petri dish; (7) Then add 20 ml of ethanol and stir; (8) Dry the sediment by drying it until it is completely dry; and (9) Weigh the starch powder [7].

b. Amylum Observation

Prepare the necessary tools and materials: (1) Using a spoon, transfer some samples of starch powder into a measuring cup, then dissolve them in distilled water; (2) Take a little and place it on top of the glass object; (3) Closed with a cover

glass; (4) Seen through a microscope lens; and (5) Take a photo of the findings from the microcopy. [7]

RESULTS AND DISCUSSION

After observing under a microscope on 3 types of plants including, Sago, Bengkuang and Taro. Obtained data as follows:

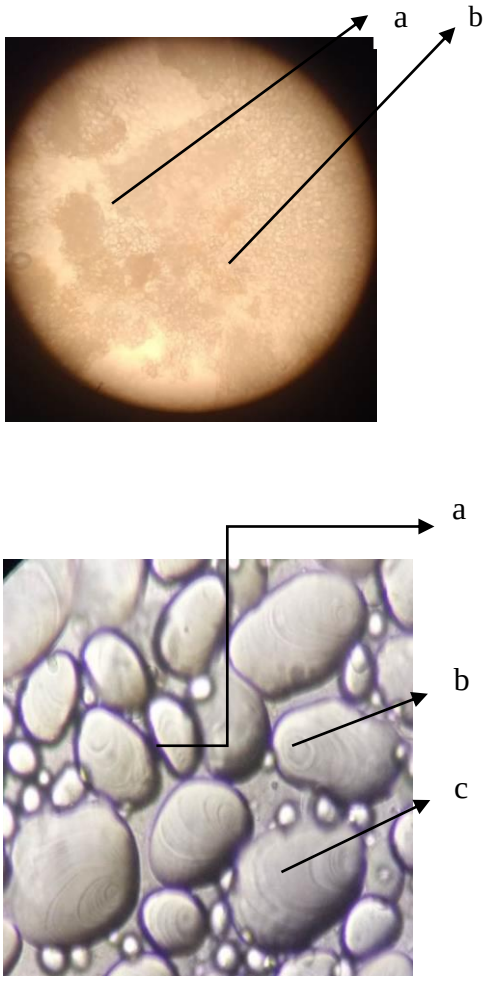

Figure 1: Shape and size of starch in Sago

Sample :

Sago (*Metroxylon sago*)

Magnification 10 X

Note:

a. *Starch granules*

b. *Hilus*

c. *Lamella*

Description :

Has an oval starch shape with varying sizes, some are few, some are moderate, and the conditions are spread and dense, so they are eccentric. The lamellae are visible along the hilus. Sutrian (2011) said eccentric starch is starch with a high hilum.

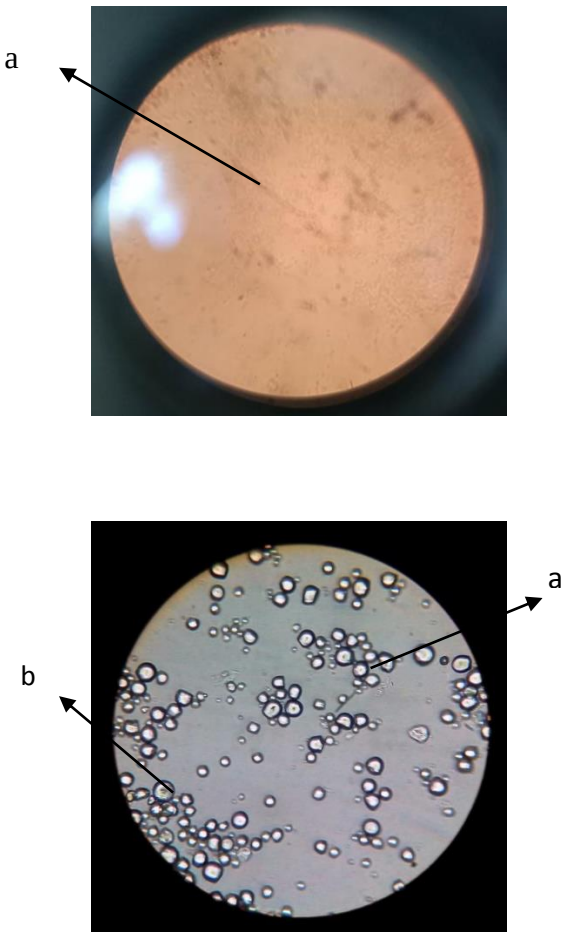

Figure 2: Shape and size of starch in Jicama

Sample:

Jicama (*Pachyrhizus erosus*)

Magnification 100x

Note:

a. *Starch granules*

b. *Hilus*

Description of microscopic observations:

It has a round starch shape with a relatively small size, the starch is spread but not too dense, the starch type in Jicama belongs to the concentric starch type, the hilum is in the middle and the lamellae are not visible. According to Sri Mulyani (2019), starch granules contain a layer around the hilum, and if it is in the middle, it is concentric starch.

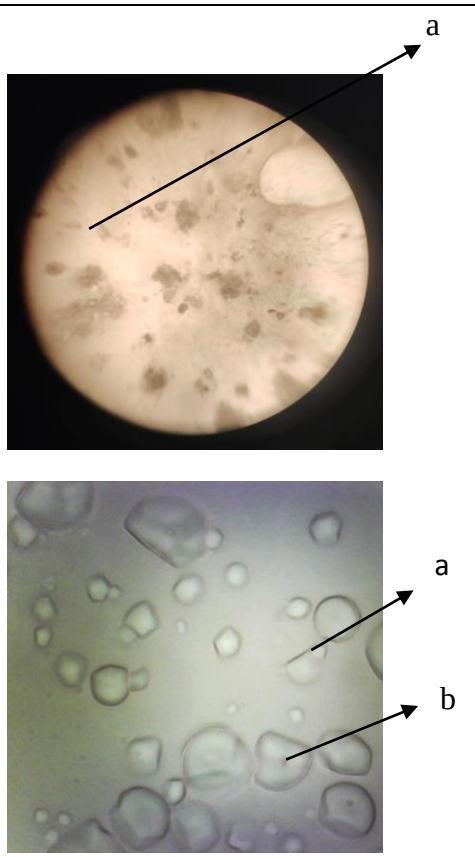

Figure 3: Shape and size of starch in taro

Sample :

Taro (*Colocasia esculenta*)

40X . Magnification

Note :

a. *Starch granules*

b. *Hilus*

Description of microscopic observations:

It has a round and lumpy starch shape, looks rougher on the agglomerated starch plane, has a wide size in the starch lump area and is smoother on the edge. So that the type of starch in taro including the type of concentric, hilus and lamellae are not visible. Kumalawati (2018) states that there are two types of starch, one of which has a round shape with a hilus in the middle.

Based on microscopic observations in the laboratory, the starch content of Sago, Jicama, and Taro is round to oval, small to medium, etc. Starch contains amylose and amylopectin [6]. Starch is 20% water soluble (amylose) and 80% water insoluble bavian (amylopectin).

Starch is an organic substance made by photosynthesis in plant leaves and stored in seeds, stems, bark, and roots. According to the starch observation results of this study [8] Concentric and eccentric starches are described. Concentric starch has a hilum in the middle, while eccentric starch is oval in shape and has a hilum at the edges.

Figure 1 illustrates the observation of sago starch with an oval shape, spread over the sample slide so that it enters an eccentric hilar shape at the edges and the lamellae are clearly visible. Sago at 10X magnification appears denser because the starch is dispersed. The object of observation on the yam plant has a round starch shape and partly associated with the type of concentric starch; the hilum is in the center and the lamellae are not visible at 100X magnification. Based on Figure 3, the taro plant has a round starch shape that accumulates in the middle of the preparation and spreads to the edges. The hilus is in the middle and the lamellae are not visible. Taro viewed with a microscope 40x. The data above shows that the shape of starch in edible plants is quite diverse, including round to oval shaped plants with a smooth and lumpy starch structure.

CONCLUSION

The discussion above can be concluded that (1) Types of starch are divided into 2, namely concentric (round) and eccentric (oval), in the experiments carried out there was a concentric type in Sago and Taro plant preparations while Bengkoang had an eccentric type due to the oval shape of starch. (2) Observations were made under a microscope, each preparation has a different magnification to be able to see the shape of starch in each sample. Sago has a microscope magnification of 10X, Jicama has a microscope magnification of 100X while Taro plants have a microscope magnification of 40X. (3) Distributed and accumulated starch can be identified based on the type of sample preparation used

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