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Identification of Morphological Characteristics of Sidimpuan Snake Fruit *(Salacca sumatrana* Becc.*)*

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Abstract

The Sidimpuan snake fruit (*Salacca sumatrana* Becc.) Plants have several varieties, one of which has a distinctive feature in the taste and color of the fruit flesh. The diversity of types of sidimpuan snake fruit (*Salacca sumatrana* Becc) is very high so that the quality of sidimpuan snake fruit (Salacca sumatrana Becc) is still very diverse. The purpose of this study was to obtain data on the basic properties of the morphological characteristics of sidimpuan snake fruit (*Salacca sumatrana* Becc), determine the kinship of sidimpuan snake fruit (*Salacca sumatrana* Becc) types, and determine the level of similarity of sidimpuan snake fruit (*Salacca sumatrana* Becc) types based on the taste and color of the fruit flesh. The results of the study from the three locations in Padangsidimpuan City revealed the morphological characteristics of sweet snake fruit (less), having a round oval to long triangular shape with brown to yellowish-brown fruit skin color. Sweet snake fruit (medium) has a round and long triangular shape with brown to yellowish-brown skin color. Sweet snake fruit has a round oval to round triangular shape with black and brown fruit skin color. White snake fruit has a round oval to round triangular fruit shape with brown and yellowish-brown skin color. Red-tinged snake fruit has a round oval and long triangular fruit shape with brown to yellowish-brown skin color. The dendrogram of the sidimpuan snake fruit (Salacca sumatrana Becc) kinship relationship based on the morphological characteristics of five types of salak, namely sweet snake fruit(less), sweet snake fruit (moderate), sweet snake fruit, white snake fruit, and red snake fruit, obtained three clusters from each location. Lubuk Raya Village, the Sidimpuan snake fruit kinship relationship based on five types of snake fruits, has a similarity level of 84 %. Batu Layan Village, the Sidimpuan snake fruit kinship relationship based on five types of snake fruit, has a similarity level of 92 %, and Palopat Maria Village, the Sidimpuan snake fruit kinship relationship based on five types of snake fruit, has a similarity level of 96 %. The results of the identification of morphological characters of snake fruit from three research locations based on the morphological characteristics of five types of snake fruit show genetic similarities, namely in the shape of the stem, leaf shape, upper leaf color, lower leaf color, leaf sheath color, thorn color, flower color, fruit shape, and fruit skin color.

***Keywords**: Characteristics , Identification, Morphology,Taste, Snakefruit, Sidimpuan*

1. INTRODUCTIO

Villages have unique characteristics and regions that differ from each other in terms of society, economy, culture, and environment. The uniqueness of the village can be developed according to its potential (Nur Qomariah et al., 2019). snake fruit plants are one of the superior products of the agricultural sector in South Tapanuli Regency (Agung

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and Ningtias, 2020). In general, Salacca sumatrana comes from South Tapanuli. Based on data sourced from the Food Crops and Horticulture Service of North Sumatra Province in 2019, the area with the largest snake fruit production and the largest harvest area in North Sumatra is South Tapanuli Regency. Angkola Barat District is a centre for snake fruit planting in South Tapanuli Regency, with a snake fruit planting area of 13,928 ha and a production volume of 192,501.40 tonnes in 2019, having the largest harvest area among other districts in South Tapanuli (BPS, 2020). However, the production centre is famous in the Padangsidimpuan area, so the city of Padangsidimpuan is known as the City of snake fruit. In addition to its sweet, sour, and astringent taste, the unique thing about Sidimpuan snake fruit is that it has characteristics such as thick red flesh, tinged with red and white. The skin colour is pitch black and yellowish brown with neatly arranged scales that protect the flesh of the fruit. The nutritional content in every 100 g of edible snake fruitfruit contains 77 calories, 74 g of water, 20.9 g of carbohydrates, 1.8 g of phosphorus, 0.42 g of iron, 0.4 protein, 0.2 g of vitamin C, and 0.004 g of vitamin B (Dhyanaputri et al., 2015).

The sidimpuan snake fruit plant (Salacca sumatrana Becc) belongs to the group of palm plants that grow in clumps and generally grow in groups. Snake fruit plants can be planted in lowland and highland areas. Sidimpuan snake fruit is quite well known on the islands of Sumatra and Java, with its sweet, tart, sweet (less), and astringent taste, making it different from Pondoh snake fruit and other types of salak. This snake fruitis one type of fruit is widely favored because the taste of the fruit varies, and many people like it (Kaputra, 2006). The variety of snake fruit types is very high. In Indonesia, Java has many types of snake fruit, such as Pondoh, Ambarawa, and Swaru; sidimpuan snake fruit in North Sumatra; and Bali salak. In the Padangsidimpuan City area, most of what is cultivated is sidimpuan snake fruit.

Snake fruit plants have several varieties, one of which has a distinctive characteristic in terms of the taste and appearance of the fruit, and so far, there have been many famous snake fruit production centers (Darmawati, 2019). Cultivating snake fruit plants in Padangsidimpuan is a matter of inheritance between generations in the era of ancestors, or has existed since the colonial era. The snake fruit plant (Salacca sumatrana Becc.) has several varieties, one of which has a distinctive characteristic in the taste and color of the fruit flesh. The problem faced in cultivating snake fruit plants is that the diversity of types of snake fruit (Salacca sumatrana Becc) is still very high so that the quality of the snake fruit (Salacca sumatrana Becc) is still very diverse because Padangsidimpuan has several varieties of snake fruit cultivated by farmers; therefore, the study of differences and similarities regarding morphological characters can be used to determine the closeness of the relationship between snake fruit plants so that it can be known how much similarity the sidimpuan snake fruit (Salacca sumatrana Becc) has. The closer the relationship, the lower the similarity, and the closer the relationship, the higher the similarity. The morphological characteristics of snake fruit plants can be observed based on vegetative and generative characteristics, which are useful for obtaining descriptions and classifications of snake fruit plants, making it easier to determine the varieties of snake fruit plants. (Puslitbanbun, 2007).

Morphological observation of sidimpuan snake fruit (Salacca sumatrana Becc) aims to obtain data on the basic properties of the morphological characteristics of sidimpuan snake fruit (Salacca sumatrana Becc) based on the taste and color of the fruit flesh, determine the kinship relationship of the sidimpuan snake fruit (Salacca sumatrana Becc) species based on the taste and color of the fruit flesh, and determine the level of similarity

of the sidimpuan snake fruit (Salacca sumatrana Becc) species based on the taste and color of the fruit flesh.

Based on this, the author is motivated to conduct research on several morphological characteristics of the Sidimpuan snake fruit plant (Salacca sumatrana Becc). The results of this study are expected to be used as reference material or information for the development of sidimpuan snake fruit plants (Salacca Sumatrana Becc) in the future, as well as to produce high-quality sidimpuan snake fruit plants (Salacca Sumatrana Becc) as economic selling value.

2. METHOD

This research was conducted in the snake fruit farmers' land, which is the center of snake fruit planting, namely Lubuk Raya Village with an altitude of 700 m above sea level, Palopat Maria Village with an altitude of 463 m above sea level, and Batu Layan Village at an altitude of 500 m above sea level. This study was conducted between April and May 2024.

The materials used in this study were Sidimpuan snake fruit plants, and the tools used were brand boards, research sample labels, cameras, refractometers, mortars, tissues, meters, plastic ropes, knives, scissors, machetes, and stationery.

The research was conducted using a survey method by taking selected samples, namely those from the centers of snake fruit planting in Padangsidimpuan City. Samples were collected from Lubuk Raya Village, Palopat Maria Village, and Batu Layan Village; one yard was determined to have snake fruit plants. The criteria for sample plants in this study were snake fruit plants that were productive with criteria based on the taste of snake fruit, consisting of three levels based on the dissolved sugar content (Brix): Sweet, Sweet (moderate), and sweet (less). The color of snake fruit flesh consists of two levels: red tinge and white.

The number of sampled plants for each criterion was 10. Thus, the total number of sample plants for morphological character observation was 50 plants in each location, and the number of sample plants was 150.

The characteristics observed included qualitative characteristics, namely leaf color, leaf sheath color, thorn color, flower color, fruit skin color, leaf shape, stem shape, and fruit shape; quantitative characteristics included plant height, leaf sheath length, leaf size, flower cob length, number of fruit bunches, and fruit weight. The research procedure begins with the determination of location; the locations obtained were Lubuk Raya Village, Palopat Maria Village, and Batu Layan Village. Sampling was then carried out, and interviews were conducted with farmers.

1. Determination of sample plants with the following criteria:

A. The taste of snake fruit consists of 3 levels
    1. Sweet (M)
    2. Medium sweet (S)
    3. Less sweet (A)

B. The color of the snake fruit flesh consists of 2 levels.
    1. White (P)
    2. Red tint (SM)

To test the BRIX level in snake fruits, the equipment required was as follows:

1. Refractometer

This handheld device measures the refraction of light in liquid. This was used to determine the sugar content of the solution.

2. Mortal

To extract the flesh from the snake fruit for testing.
3. Clean Container
To hold the fruit juice.
4. Water
To clean the refractometer.
5. Tissue
To wipe the refractometer.
6. Dropper pipette
To take the fruit juice
The method of taking the Brix value in the snake fruit used as a sample in this study is to take snake fruit with the criteria of Sweet, Sweet (moderate), and Sweet (less), and then each of the criteria of the snake fruit is used as a sample in the juicer to extract the snake fruit juice. To facilitate the extraction of snake fruit juice, a dropper pipette was used, then the prism cover on the refractometer was opened, and 2-3 drops were placed on the surface of the prism, and then it was closed again. The prism is pointed at the light source and viewed from the side of the binoculars, just the knob, so that the size is clearly visible; the value is read based on the boundary between the blue and white areas. The final value is:

a) Lubuk Raya Village
   1. Sweet: 22 – 23
   2. Medium sweet: 20 – 21
   3. Less sweet: 18 – 19
b) Batu Layan Village
   1. Sweet: 18 – 19
   2. Medium sweet: 16 – 17
   3. Less sweet: 14 – 15
c) Palopat Maria Village
   1. Sweet: 20 – 21
   2. Medium sweet: 16 - 19
   3. Less sweet: 12 – 15
   4. Attach labels to each sample plant.
   5. Conduct observations on each sample plant for morphological character observations.
   6. Collect and analyze data from observations during the study.

The observation parameters that will be observed in this study are the morphology of the snake fruit plant based on the five criteria that have been determined previously, consisting of:

1. Stem morphology: plant height (m) and stem shape.
2. Leaf morphology: leaf color, leaf sheath color, thorn color, leaf sheath length (m), leaf shape, and leaf size (cm).
3. Flower morphology: flower color and flower cob length (cm),
4. Fruit morphology: fruit skin color, number of bunches, fruit shape, and fruit weight (g).

Observation and measurement consist of 14 characters, namely:

1. Plant height was measured from the base of the stem to the tip of the highest leaf.
2. Stem shape: Observations in this section are based on the shape of the snake fruit plant stem.

3. Leaf shape: Observations in this section are based on the shape of the snake fruit plant leaves.
4. Leaf size (cm): Measurements were taken from the base to the tip of the leaf.
5. Leaf color: Observations in this section are based on the color of the leaves of the snake fruit plant.
6. Leaf sheath color: Observations in this section are based on the color of the leaf sheath of the snake fruit plant.
7. Leaf sheath length (m): Observations in this section were ontained from the longest sheath.
8. Thorn color: Observations in this section are based on the color of the thorns of the snake fruit plant.
9. Flower color: Observations in this section are based on the color of the flowers of the snake fruit plant.
10. Flower cob length (cm) was measured from the base of the flower cob to the tip of the flower cob.
11. Number of bunches: Observations in this section are based on the fruit bunches that have appeared.
12. Fruit shape: Observations in this section are made when the fruit is ready to harvest.
13. Fruit weight (g): fruit units weighed in each plant sample.
14. Fruit skin color: Observations in this section are based on the color of the skin of the snake fruit plant fruit.

3. RESULTS AND DISCUSSION

The results of the survey conducted in three research locations were areas where snake fruits are commonly planted by the community. Thus, three types of snake fruit were obtained, which were studied at three different locations: Lubuk Raya, Batu Layan, and Palopat Maria. The land in Lubuk Raya Village is 700 m above sea level, Palopat Maria Village is 463 m above sea level, and Batu Layan Village is 536 m above sea level. The age of the snake fruit plants studied was Lubuk Raya snake fruit ± 33 years, Batu Layan snake fruit ± 35 years, and Palopat Maria snake fruit ± 20 years.

Morphological observations were conducted by observing the morphological characteristics of five types of Sidimpuan snake fruit. The morphological characteristics observed included qualitative characteristics such as leaf color, leaf sheath color, thorn color, flower color, fruit skin color, leaf shape, stem shape, and fruit shape, whereas quantitative characteristics included plant height, leaf sheath length, leaf size, flower cob length, number of fruit bunches, and fruit weight.

3.1 Morphological Characteristics of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Based on Taste.

The results of field observations of snake fruit sidimpuan showed upright, round, and brown stems. The stems were almost invisible because they were covered with leaf sheaths that were tightly arranged and thorny. Sidimpuan plants have unique characteristics that are different from other types of snake fruit plants in general, namely that they do not require rejuvenation. This is because when they reach the age of 10 years, snake fruit plants experience lying down, so their stems spread above the ground surface for 50 cm to reach 1.5 meters and can sprout. In general, these shoots are left to live and become new trees. These new trees were subsequently used as grafted seedlings. However, in the end, the crown remained upright above the ground surface.

The height parameters of the less sweet snake fruit plant type were between 5 - 8.35 m, medium sweet 5.08 - 7.31 m, and sweet 68 m. A common characteristic of snake fruit sidimpuan stems is that if the snake fruit stem has reached a height of ± 1 m, it will fall naturally, and the stem will be parallel to the ground surface. However, the plant will not die because new roots grow on the part of the stem parallel to the ground, and the tip of the plant will slowly grow back upright. According to Adelina et al. (2021):

The types of snake fruit with less sweet taste, snake fruit with medium sweet taste, and snake fruit with sweet taste in the observations showed that the shape of the snake fruit leaves in each location was similar; namely, the color of the leaf sheath was grayish green, the color of the upper surface of the leaf was dark green, and the lower surface of the leaf was grayish green. Snake fruit thorns were unevenly distributed, very numerous on the leaf sheath, and spread on the stalk with black thorns. In accordance with the research of Harahap Gabe Pangihutan and Noer Rahmi Ardiarini (2018), it was stated that the morphological characteristics of Sidimpuan snake fruit have genetic similarities of 77%;, namely the color of the leaf sheath is grayish green, the color of the upper surface of the leaf is dark green, and the lower surface of the leaf is grayish green, and the color of the thorns on the leaf sheath is black.

The size of mature snake fruit leaves of the less sweet snake fruit type is 5891 cm long, medium sweet snake fruit leaves are 6295 cm long, and sweet snake fruit leaves are 58105 cm long. The length of the midrib of sweet snake fruit leaves is between 5 m–7.56 m, the length of midrib of sweet snake fruit leaves is between 4 m–6 m, and the length of midrib of sweet snake fruit leaves is between 4.26 m–6.10 m. Data from observations of parameters on the morphological characteristics of snake fruit based on taste can be seen in Table 1.

Table 1. Morphological characteristics of snake fruit sidimpuan based on taste.

OBSERVATION OF PARAMETERS	Types of Snake fruit		
	Less Sweet (A)	Medium sweet (S)	Sweet (M)
STEM MORPHOLOGY			
Plant Height (m)	5.00 - 8.35	5.08 - 7.31	6.00 - 8.00
Stem Shape	Round	Round	Round
LEAF MORPHOLOGY			
Leaf Sheath Length (m)	5.00 - 7.56	4.00 - 6.00	4.26 - 6.10
Leaf Size (cm)	58.00 - 91.00	62.00 - 95.00	58.00 -105.00
Leaf Shape	pinnate	pinnate	Pinnate
Upper Leaf Color	Dark Green	Dark Green	Dark Green
Lower Leaf Color	Gray Green	Gray Green	Gray Green
Leaf Sheath Color	Dark Green	Dark Green	Dark Green
Spine Color	Black	Black	Black
FLOWER MORPHOLOGY			
Flower Cob Length (cm)	27.00- 60.00	26.00 - 48.00	25.00 - 6.22
Flower Color	Red	Red	Red
FRUIT MORPHOLOGY			
Number of Fruit Bunches	2.00 - 6.00	2.00 - 6.00	2.00 - 6.00
Fruit Weight (g)	60.00 - 103.09	24.60- 101.14	33.69 - 108.00
Fruit Shape	Round - Oval - Long Triangle	Round - Long Triangle	Round - Oval - Round Triangle

OBSERVATION OF PARAMETERS	Types of Snake fruit		
	Less Sweet (A)	Medium sweet (S)	Sweet (M)
Fruit Skin Color	Brown-Yellowish Brown	Brown - yellowish brown	Black – Brown

The results of field observations of medium sweetness, less sweetness, and sweetness have the same flower color, which is red, small snake fruit flowers, and grows tightly into one series on the back of the leaf axil. When the flowers are young, they are protected by a round oval-shaped sheath-like boat. This flower is radially symmetrical (regular) and has three calyx leaves and three crown leaves, or a structure that cannot be distinguished between the calyx and crown. Snake fruit flowers are composed of two florets: large and small. Both are united at one base of the flower calyx, which has one pistil with one ovule. Sidimpuan snake fruit flowers are perfect (monoecious and hermaphrodite), where one tree has male and female flowers found on the same bunch and florets. Sidimpuan snake fruit plants do not require human assistance or other intermediaries for pollination. This makes the Sidimpuan snake fruit plant different from the types of snake fruit found on the island of Java, which depend on humans and other agents, such as insects, to help the pollination process. (Adelina, et al., 2021).

Field observations showed that snake fruits with less sweetness, medium sweetness, and sweetness have the same number of fruit bunches, between two and six bunches. According to Harahap (2013), each snake fruit plant can produce 1-5 bunches, with each bunch consists of 10-25 fruits. For every kilogram of snake fruit, there are 10-14 fruits.

The observed snake fruit skin had almost the same morphological characteristics, namely, the skin of the fruit was arranged like scales with varying colors; snake fruit with a less sweet taste and snake fruit with a medium sweet taste had the same skin color, namely brown to yellowish brown; sweet snake fruit had black and brown skin colors.

3.1.1 Dendrogram of Kinship Relationship of Snake fruit Sidimpuan Based on Less Sweet Taste.

The results of the research on Sidimpuan snake fruit based on sweet taste (less) obtained a dendrogram of kinship relationships of snake fruit from three research locations in the following figure:

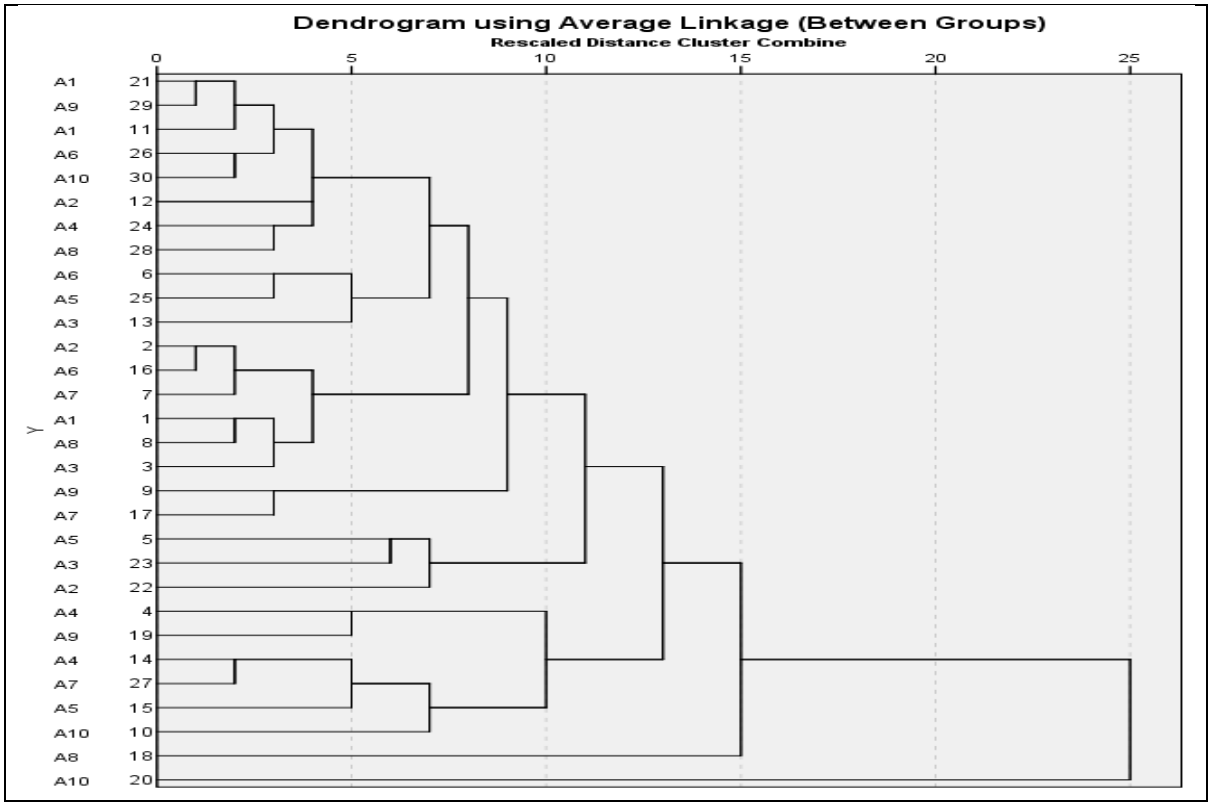

Figure 1. Dendrogram of kinship relationships of snake fruit Sidimpuan (Salacca sumatrana Becc) based on sweet taste less (A).

The dendrogram of kinship relationships of snake fruit from the output results above shows that the samples can be grouped into three clusters. Cluster 1 consists of A10; Cluster 2, A8; and Cluster 3, A10, A5, A7, A4, A9, A4, A2, A3, A5, A7, A9, A3, A8, A1, A7, A6, A2, A3, A5, A6, A8, A4, A2, A10, A6, A1, A9, and A1. Cluster 3 had a higher level of similarity, which is 93.3%), meaning that the kinship relationship of snake fruit based on the sweet taste (less) from the three locations is known to have a close kinship relationship with a similarity level of 93.3%. In accordance with the research of Harahap and Noer (2018), it states that the morphological characters of Sidimpuan snake fruit have quantitative and genetic similarities of 90%.

3.1.2 Dendrogram of Snake fruit Sidimpuan Kinship Relationship Based on Medium Sweetness.

The results of the research on Sidimpuan snake fruit based on sweetness (moderate) obtained a dendrogram of snake fruit kinship relationships from three research locations in the following figure:

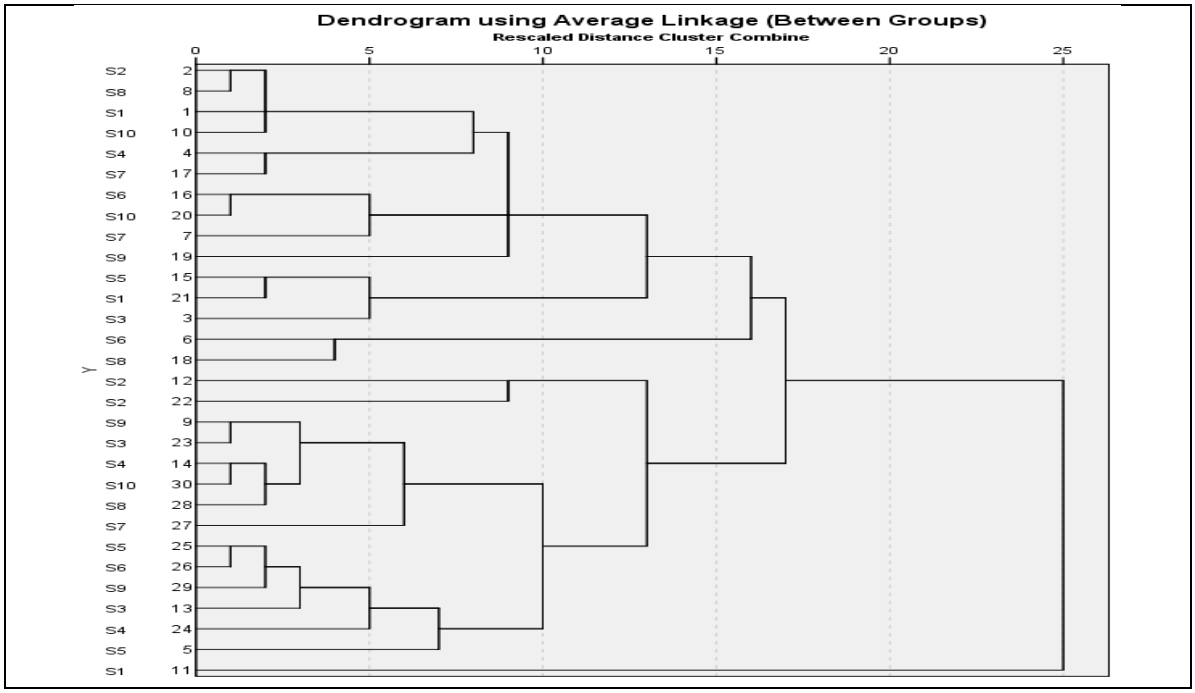

Figure 2. Dendrogram of snake fruit Sidimpuan kinship relationships (Salacca sumatrana Becc) based on sweetness moderate (S)

The dendrogram of snake-fruit kinship relationships from the output results above shows that the samples can be grouped into three clusters. Cluster 1 consists of S1; Cluster 2 consists of S5, S4, S3, S9, S6, S5, S7, S8, S10, S4, S3, S9, S2, and S2; and Cluster 3 consists of S8, S6, S3, S1, S5, S9, S7, S10, S6, S7, S4, S10, S1, S8, and S2. Cluster 3 had a higher level of similarity, which is 50%), meaning that the kinship relationship of snake fruit based on the sweet taste (less) from the three locations is known to have a close kinship relationship with a similarity level of 50%. In accordance with the research of Harahap and Noer (2018), it states that the morphological characteristics of snake fruit sisundung 4 and snake fruit sisundung 5 have a similarity of 88%.

3.1.3 Dendrogram of Kinship Relationship of Snake fruit Sidimpuan Based on Sweetness.

The results of the research on Sidimpuan snake fruit based on sweetness obtained a dendrogram of kinship relationships of snake fruit from three research locations in the following figure:

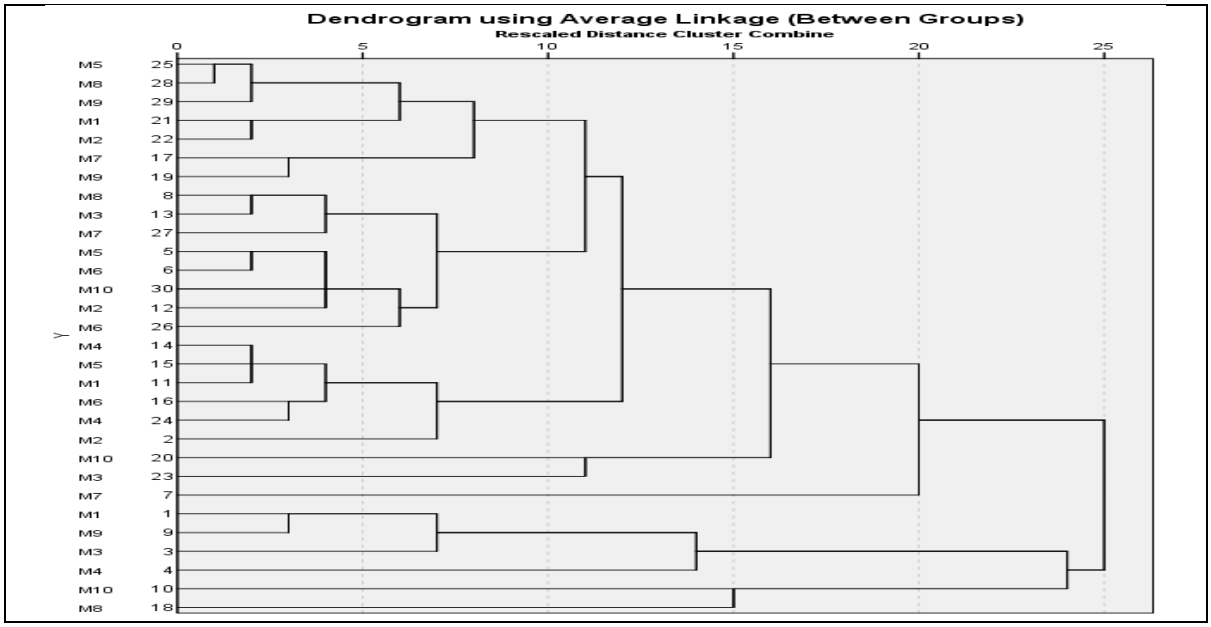

Figure 3. Dendrogram of kinship relationships of snake fruit Sidimpuan (Salacca sumatrana Becc) based on sweetness (M)

The dendrogram of kinship relationships of snake fruits from the output results above shows that the samples can be grouped into three clusters. Cluster 1 consists of (M8, M10); Cluster 2, of (M4, M3, M9, M1); and Cluster 3, of (M7, M3, M10, M2, M4, M6, M1, M5, M4, M6, M2, M10, M6, M5, M7, M3, M8, M9, M7, M2, M1, M9, M8, M5). Cluster 3 had a high similarity level of 80%, meaning that the dendrogram of the kinship relationship of snake fruit based on the sweet taste of the three locations is known to have a close kinship relationship with a similarity level of 80%. Diversity can arise due to environmental factors and genetic variation, for example, cross-pollination. Differences and similarities in the external morphology of a plant species can be used to determine the closeness of the kinship relationship (Suskendriyati, et al., 2000).

3.2 Morphological Characteristics of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Based on Fruit Flesh Color

Data from the observation of parameters of the morphological characteristics of snake fruit based on color are shown in Table 2.

Table 2. Morphological Characteristics of Sidimpuan Snake Fruit Based on Color.

OBSERVATION OF PARAMETERS	Types of Snake fruit	
	White Color	Red Tint Color
STEM MORPHOLOGY		
Plant Height (m)	5.67 - 8.65	5.40 - 8.83
Stem Shape	Round	Round
LEAF MORPHOLOGY		
Leaf Sheath Length (m)	4.00 - 7.56	4.48 - 6.50
Leaf Size (cm)	55.00 – 102	59.00 - 95.00
Leaf Shape	Pinnate	Pinnate
Upper Leaf Color	Dark Green	Dark Green
Lower Leaf Color	Gray Green	Gray Green
Leaf Sheath Color	Dark Green	Dark Green

OBSERVATION OF PARAMETERS	Types of Snake fruit	
	White Color	Red Tint Color
Spine Color	Black	Black
FLOWER MORPHOLOGY		
Flower Cob Length (cm)	28.00 - 55.00	26.00 - 58.00
Flower Color	Red	Red
FRUIT MORPHOLOGY		
Number of Fruit Bunches	2.00 - 6.00	2.00 - 6.00
Fruit Weight (g)	51.00 - 139.00	50.00 - 109.12
Fruit Shape	Round - Oval - Round Triangle	Round - Oval - Long Triangle
Fruit Skin Color	Brown- Yellowish Brown	Brown - yellowish brown

In this study, the shape of the snake fruit based on the snake fruit ranged from round to oval to round triangle, and the red snake fruit ranged from round to oval to long triangle with pointed tips and rounded bottoms. The skin of the snake fruit has almost the same morphological characteristics, namely, the skin is arranged like scales with varying colors; white snake fruit and red snake fruit have the same skin color, namely, brown to yellowish brown. The weight of the white snake fruit ranged from 51 g to 139 g, and that of the red snake fruit ranged from 50 g to 109.12 g.

3.2.1 Dendrogram of Kinship Relationship of Snake Fruit Sidimpuan Based on White Color.

The results of the research on snake fruits in Sidimpuan based on white color obtained a dendrogram of kinship relationships of snake fruits from three research locations in the following image:

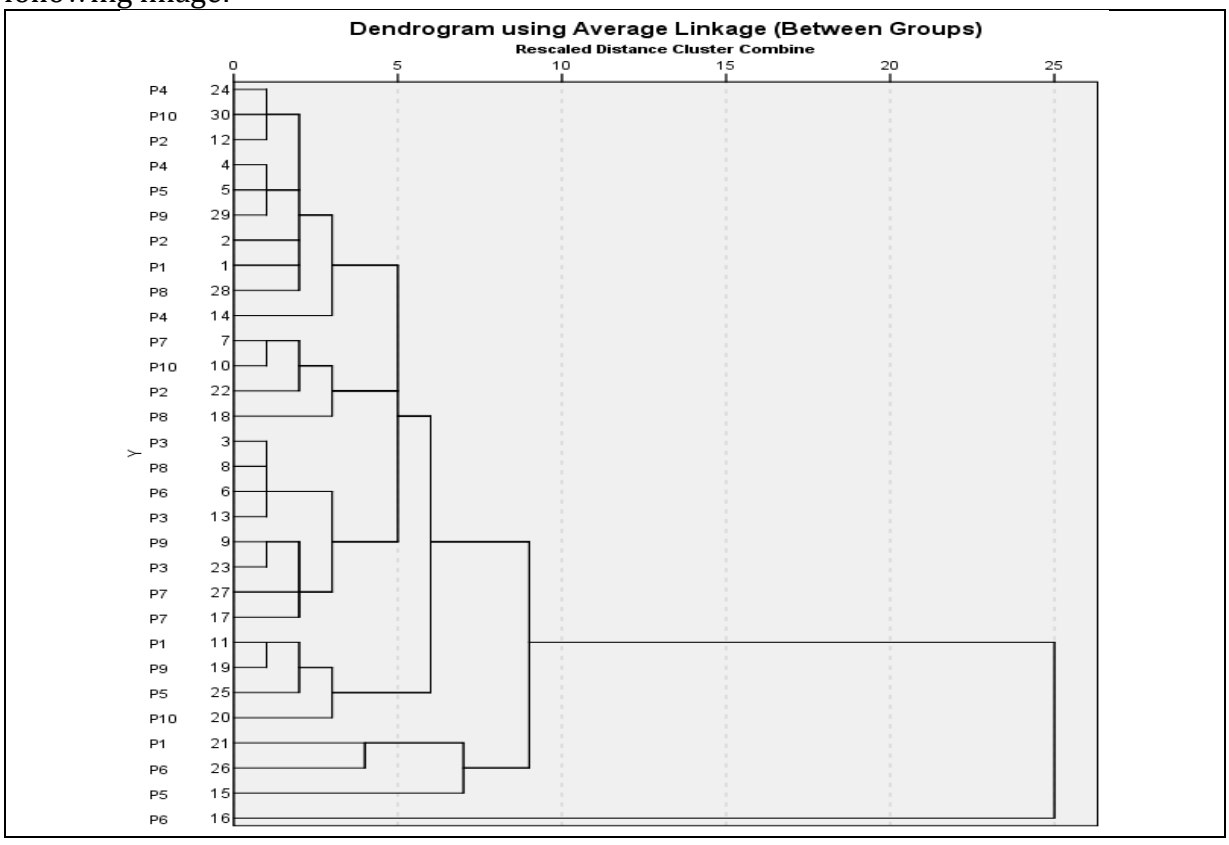

Figure 4. Dendrogram of Kinship Relationship of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Based on White Color.

The dendrogram of kinship relationships of snake fruit from the output results above shows that the samples can be grouped into three clusters. Cluster 1 consists of P6; Cluster 2 consists of P5, P6, and P1; and Cluster 3 consists of P10, P5, P9, P1, P7, P7, P3, P9, P3, P6, P8, P3, P8, P2, P10, P7, P4, P8, P1, P2, P9, P5, P4, P2, P10, and P4. Cluster 3 had a higher similarity level of 86.7%, meaning that the kinship relationship of snake fruits based on the white color of the three locations is known to have a close kinship relationship with a similarity level of 86.7%. This can be caused by the environmental and genetic factors of each snake fruit plant, so that its kinship relationship can be observed. Diversity can arise due to environmental factors and genetic variation, for example, cross-pollination. Differences and similarities in the external morphology of a plant species can be used to determine the closeness of the kinship relationship (Suskendriyati, et al., 2000).

3.2.2 Dendrogram of Kinship Relationship of Snake Fruit Sidimpuan Based on Red Tint Color.

The results of the research on snake fruit in Sidimpuan based on the red tint color obtained a dendrogram of kinship relationships of snake fruit from three research locations in the following image:

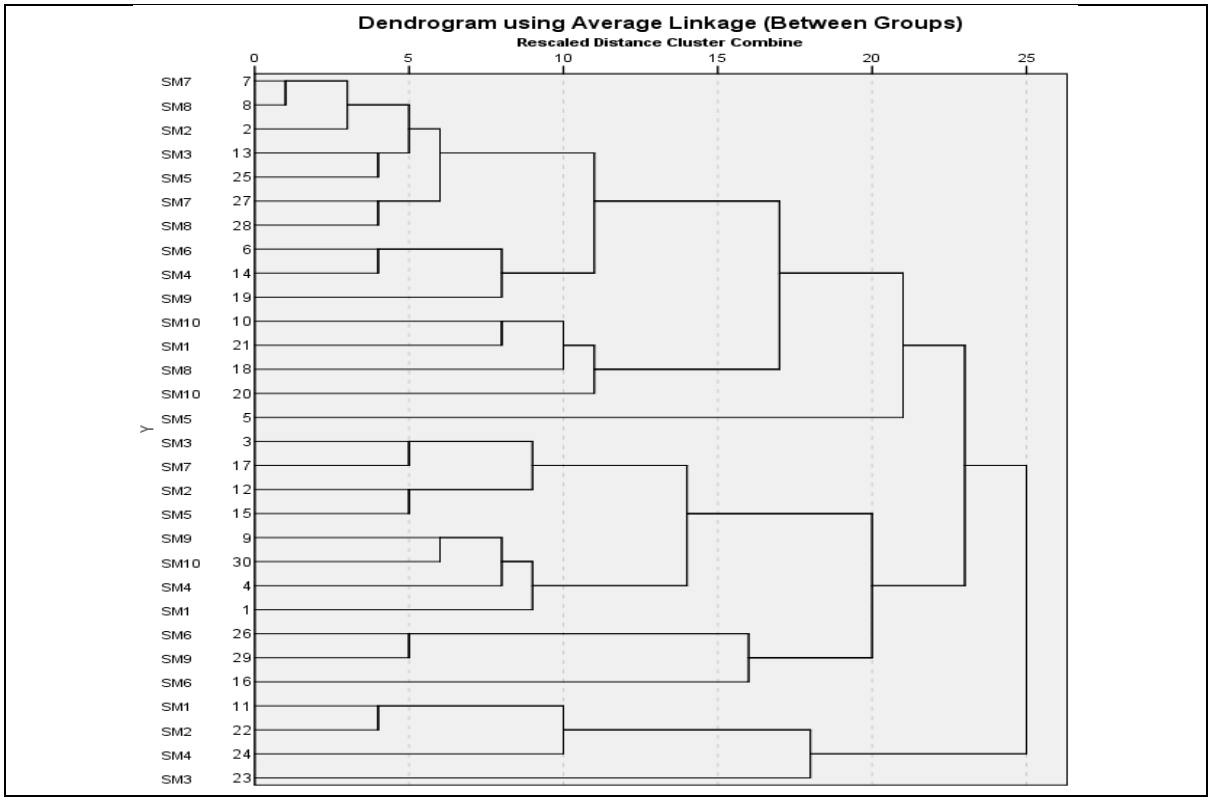

Figure 5. Dendrogram of Kinship Relationship of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Based on Red Tint Color (SM)

The dendrogram of kinship relationships of snake fruits from the output results above shows that the samples can be grouped into three clusters. Cluster 1 consisted of (SM3,

SM4, SM2, and SM1); Cluster 2 consisted of (SM6, SM9, SM6, SM1, SM4, SM10, SM9, SM5, SM2, SM7, SM3, SM5, SM10, SM8, SM1, and SM10); and Cluster 3 consisted of (SM9, SM4, SM6, SM8, SM7, SM5, SM3, SM2, SM8, and SM7). Cluster 2 had a higher similarity level of 50%, meaning that the kinship relationship of snake fruit based on the red tinge of the three locations is known to have a close kinship relationship with a similarity level of 50%. This can be caused by the environmental and genetic factors of each snake fruit plant, so that its kinship relationship can be observed. Diversity can arise due to environmental factors and genetic variation, for example, cross-pollination. Differences and similarities in the external morphology of a plant species can be used to determine the closeness of the kinship relationship (Suskendriyati, et al., 2000).

3.3 Morphological Cluster Analysis of Snake Fruit Sidimpuan (Salacca sumatrana Becc) in Lubuk Raya Village Based on Taste and Color of Fruit Flesh.

From the results of the research on snake fruit based on the taste and color of the fruit flesh, a dendrogram of the kinship relationship of snake fruit from Lubuk Raya Village was obtained. Each sample is shown in Figure 6.

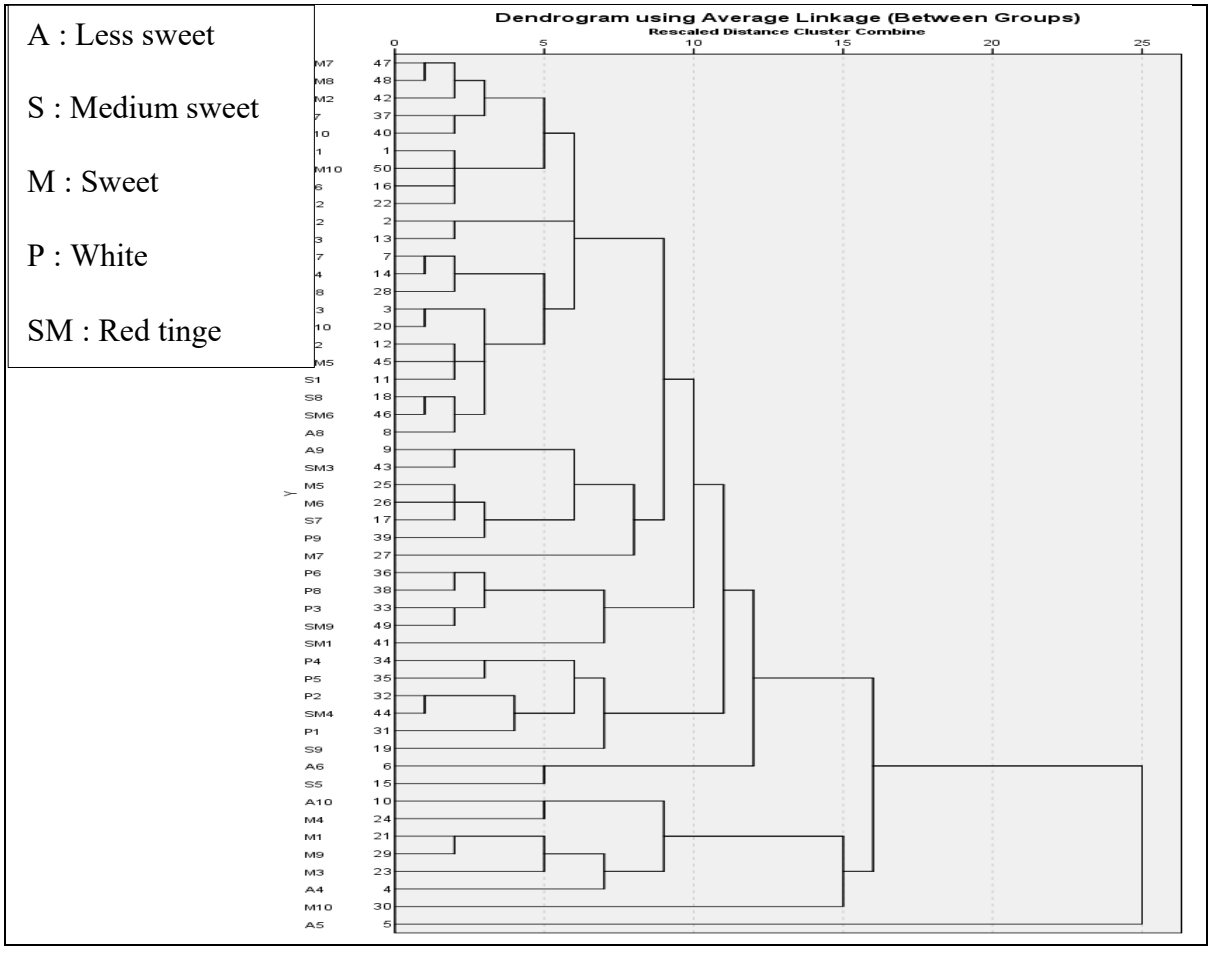

Figure 6. Dendrogram of Morphological Characteristics of Snake Fruit Sidimpuan (Salacca sumatrana Becc) in Lubuk Raya Village Based on Taste and Color of Fruit Flesh.

From the dendrogram of the kinship relationship of snake fruit from the output results above, the samples can be grouped into three clusters. Cluster 1 consists of (A5), Cluster 2 (M10, A4, M3, M9, M1, M4, A10), and Cluster 3 (S5, A6, S9, P1, SM4, P2, P5, P4, SM1,

SM9, P3, P8, P6, M7, P9, S7, M6, M5, SM3, A9, A8, SM6, S8, S1, SM5, S2, S10, A3, M8, S4, A7, S3, A2, M2, S6, SM10, A1, P10, P7, SM2, SM8, SM7). Cluster 3 had a higher level of similarity, which is 84%), indicating that the dendrogram of the kinship relationship of snake fruit based on the taste and color of the fruit flesh in Lubuk Raya Village is known to have a close kinship relationship with a similarity level of 84%.

3.4 Morphological Cluster Analysis of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Batu Layan Village Based on Taste and Color of Fruit Flesh.

From the results of the research on snake fruit based on the taste and color of the fruit flesh, a dendrogram of the kinship relationship of snake fruit from Batu Layan Village is shown in Figure 7.

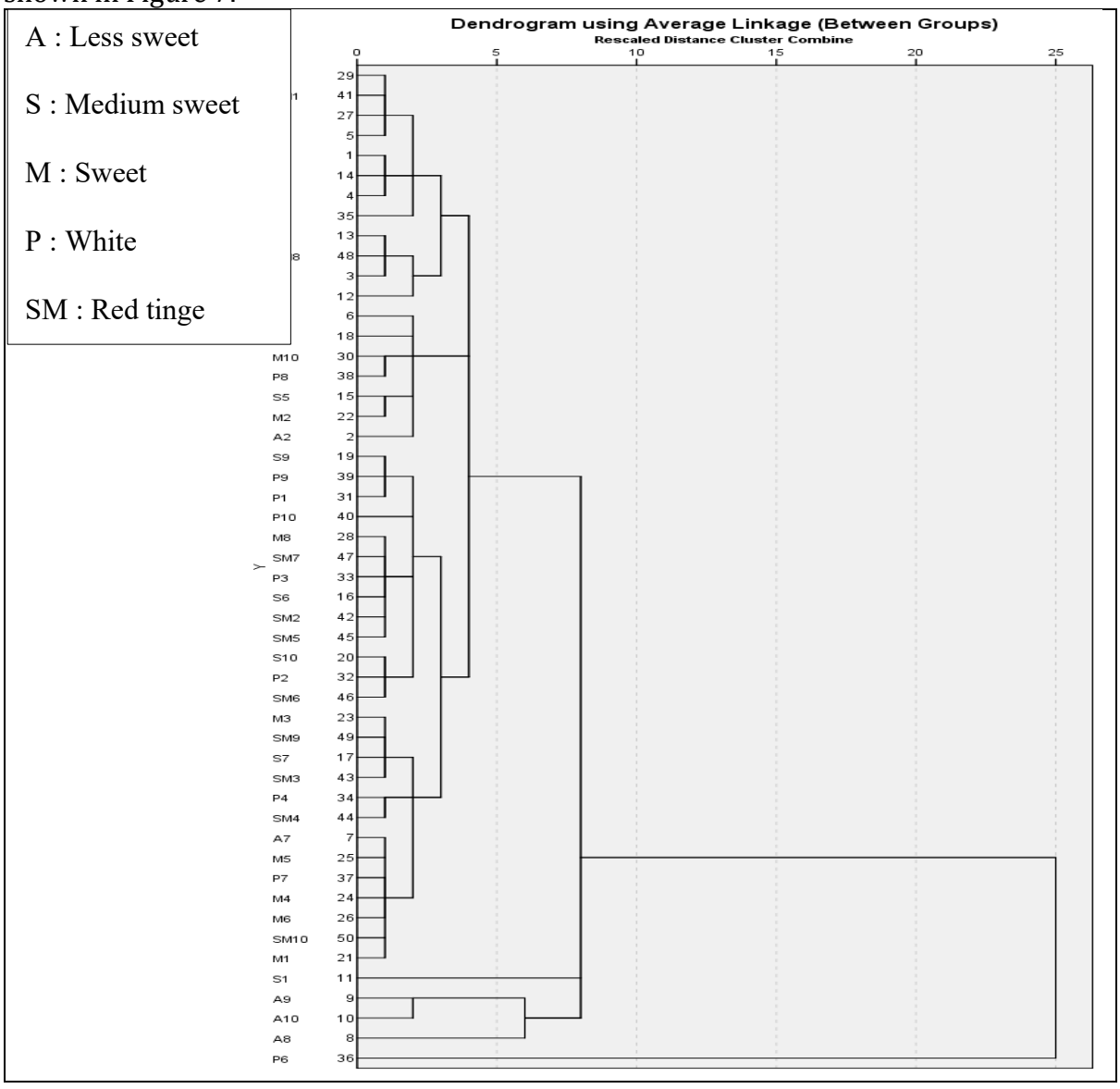

Figure 7. Dendrogram of Morphological Characteristics of Snake Fruit Sidimpuan (Salacca sumatrana Becc) Batu Layan Village Based on Taste and Color of Fruit Flesh.

From the dendrogram of the kinship relationship of snake fruit from the output results above, the samples can be grouped into three clusters. Cluster 1 consists of (P6), Cluster 2 (A8, A10, A9), and Cluster 3 (S1, M1, SM10, M6, M4, P7, M5, A7, SM4, P4, SM3, S7, SM9,

M3, SM6, P2, S10, SM5, SM2, S6, P3, SM7, M8, P10, P1, P9, S9, A2, M2, S5, P8, M10, S8, A6, S2, A3, SM8, S3, P5, A4, S4, A1, A5, M7, SM1, M9). Cluster 3 had a high level of similarity, namely 92%). In accordance with the research of Harahap and Noer (2018), it states that the quantitative morphological characteristics of Sidimpuan snake fruit have a similarity of 92%.

6.5 Morphological Cluster Analysis of Snake Fruit Sidimpuan (Salacca sumatrana Becc) from Palopat Maria Village Based on Taste and Color of Fruit Flesh.

From the results of the research on snake fruit based on the taste and color of the fruit flesh, a dendrogram illustrating the kinship relationship of snake fruit from Palopat Maria Village was obtained; each sample can be seen in Figure 8 below:

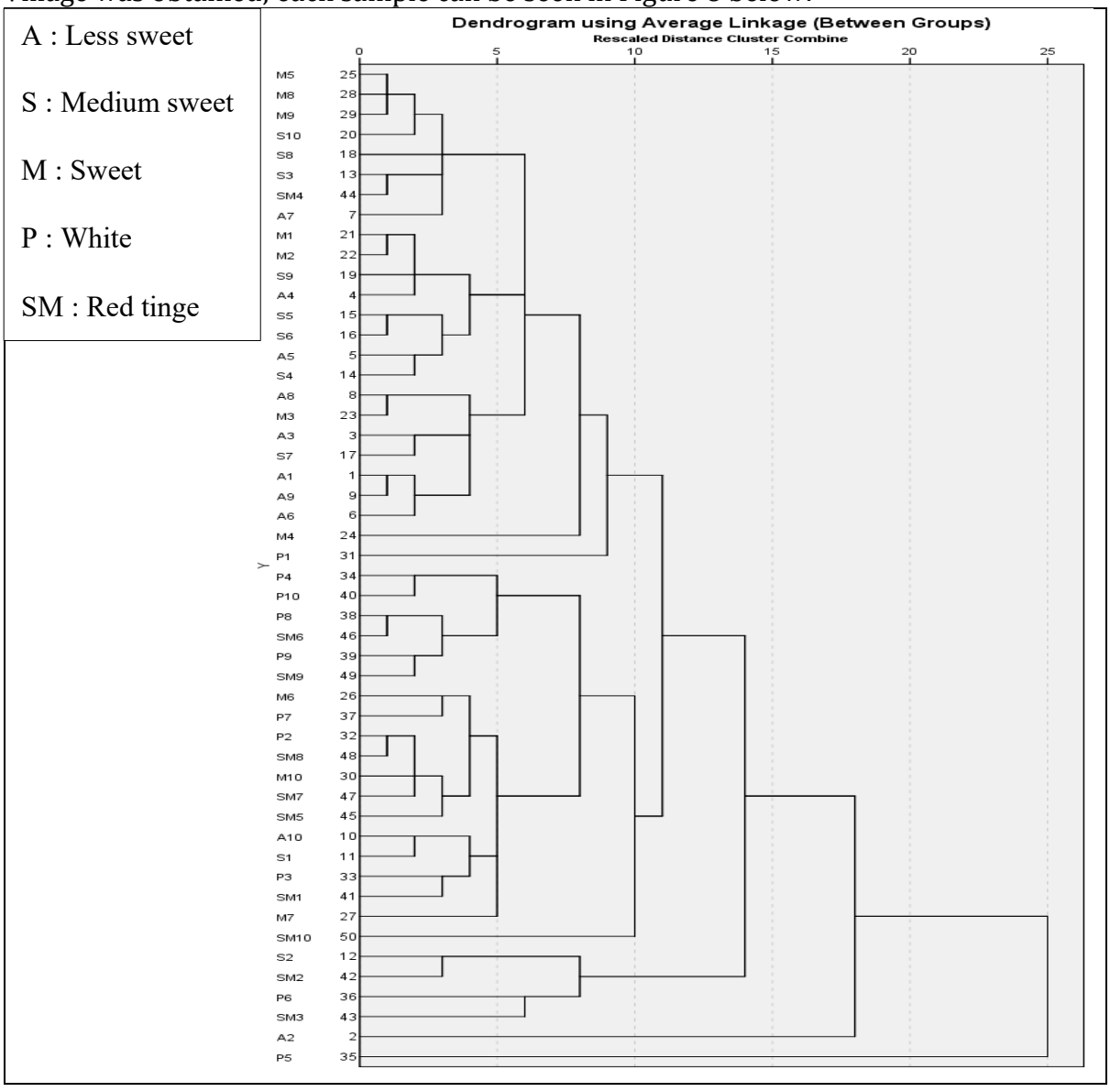

Figure 8. Dendrogram of the Morphological Characteristics of Snake Fruit Sidimpuan (Salacca sumatrana Becc) from Palopat Maria Village Based on Taste and Color of Fruit Flesh.

The dendrogram highlights the kinship relationship of snake fruits from the output results above, illustrating that the samples can be grouped into three clusters. Cluster 1

includes (P5), Cluster 2 (A2), and Cluster 3 (SM3, P6, SM2, S2, SM10, M7, SM1, P3, S1, A10, SM5, SM7, M10, SM8, P2, P7, M6, SM9, P9, SM6, P8, P10, P4, P1, M4, A6, A9, A1, S7, A3, M3, A8, S4, A5, S6, S5, A4, S9, M2, M1, A7, SM4, S3, S8, S10, M9, M8, and M5). Cluster 3 exhibited a higher similarity level of 96%, indicating that the kinship relationship of snake fruit based on taste and color of the fruit flesh in Palopat Maria Village has a close kinship relationship with a similarity level of 96%.

7. CONCLUSION AND SUGESTIONS

CONCLUSION

The identification of morphological characteristics of snake fruit based on the taste and color of the fruit flesh showed that sweet snake fruit (less) had a round, oval, and long triangular fruit shape with a brown-yellowish-brown fruit skin color. Sweet snake fruit (medium) has a round and long triangular fruit shape with a brown-yellowish-brown skin color. Sweet snake fruit has a round, oval, and round triangular shape with black-brown fruit skin color. White snake fruit is a round, oval, or round triangular fruit with a brown and yellowish-brown fruit skin color. Snake fruit with a red tinge has a round, oval, and long triangular shape with a brown and yellowish-brown fruit skin color.

The results of the dendrogram of the kinship relationship of Sidimpuan snake fruit based on the morphological characteristics of the five types of snake fruit obtained three clusters from each location. In Lubuk Raya Village, the kinship relationship of Sidimpuan snake fruit has a similarity level of 84%. In Batu Layan Village, the kinship of Sidimpuan snake fruit has a similarity level of 92%. In Palopat Maria Village, the kinship of Sidimpuan snake fruit has a similarity level of 96 %. The results of the identification of morphological characteristics of snake fruit from three research locations, namely Lubuk Raya Village, Batu Layan Village, and Palopat Maria Village, based on the morphological characteristics of five types of snake fruit, show that there are genetic similarities, namely, stem shape, leaf shape, upper leaf color, lower leaf color, leaf sheath color, thorn color, flower color, fruit shape, and fruit skin color.

SUGESTIONS

For further research, the author suggests conducting research on the morphological characteristics of sidimpuan snake fruit based on the taste and color of the fruit flesh at several different locations by conducting chemical research on snake fruitfruit to prove the results of basic morphological data based on the morphological characteristics of five types of snake fruit that have been identified in the field.

As a reference material for all groups to promote this Padangsidimpuan snake fruit so that the characteristics of Padangsidimpuan City are always remembered by many people, for the morphological recommendations of Padangsidimpuan snake fruit with sweet salak, it has a round oval and round triangular shape with black and brown fruit skin colours.

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