

Exploration of Physical and Chemical Properties of Local Durians (*Durio zibethinus* Murr.) in Lahat District, South Sumatera

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Abstract. Exploration of physical and chemical properties of local durian (*Durio zibethinus* Murr.) in Lahat District, South Sumatera, Indonesia was conducted on varieties of *Kimsel*, *Naim* and *Caya* from Pagar Jati village, Lahat district, Indonesia. The largest size among those durians was *Kimsel* variety followed by *Naim* and *Caya* varieties. The average weight of *Kimsel*, *Naim* and *Caya* variety were 2.711, 2.184 and 2.155 g, respectively. The height of the fruit was in the range of 19 to 21 cm with an average diameter of 17.68 to 18.15 cm. The spines of the *Kimsel* variety were thinner and sharper than *Naim* and *Caya* varieties. The average weight of the aril of *Kimsel*, *Naim* and *Caya* variety were 1.254, 1.444 and 1.745g, respectively. The weight of durian flesh of the *Kimsel* variety was 630g with 19 seeds in each fruit, whereas the flesh of the *Naim* variety was only 466g with 12 seeds, and *Caya* variety has the largest amount of durian flesh (645g) with 15 seeds. The measurement of Yellowness Index (YI) on durian flesh showed that the highest YI (46.3) was found in the *Kimsel* variety, followed by *Naim* variety (37.12) and *Caya* variety (32.77). The softest texture was found in the *Kimsel* variety, followed by *Naim* and *Caya* variety. Analysis of vitamin C showed that there was 28.16, 18.48, and 21.12mg/100g of vitamin C in *Kimsel*, *Naim* and *Caya* varieties, respectively. The highest protein content (2.32%) was in *Caya* variety followed by *Naim* (1.89%) and *Kimsel* variety (1.52%).

1 Introduction

An example of a tropical fruit that is unique and classified as an exotic fruit is durian (*Durio zibethinus* Murr.). Durian fruit has a hard, spiny outer skin and soft flesh with a distinctive aroma. Some individuals enjoy the distinctive aroma of durian, but others consider this aroma to be unpleasant. South Sumatera, apart from being famous for producing unique local fruits such as duku (*Lansium domesticum*), is also known for having unique varieties of local durian fruit, particularly in the Lahat Regency. Lahat durian fruit generally has a relatively smaller size compared to other durian fruits found

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in the market. The local Lahat durian fruit is not widely marketed outside of Lahat because it has not been cultivated commercially.

Lahat Regency has several local durian varieties, but only five of them have been certified, namely *Bantal Mas*, *Burung Api*, *Linsing*, *Kebau* and *Linar* varieties. The harvest period for these local durian fruits is uncertain. Their growth is slow for harvest, possibly because they grow in the wild and are not properly maintained by the local community. In general, the harvest of Lahat durian varieties occur in two areas, namely (1) in rural areas in Lahat, and [2] in mountainous or hilly areas. Local durian fruits in rural areas are usually harvested first.

Study on characteristics of local durian has been carried out by some researchers. Most of these studies focus on the morphological characteristics of local durians. For example, the exploration on the morphological characteristics of local durians from Kulon Progo (Yogyakarta) [1], Banten [2], Ngawi [3], Rembang [4] and east Jawa [5] Other studies investigating antioxidant properties of local durians in Thailand [6] (and Malaysia [7]. Besides morphological characteristics and bioactive components, other studies also explored the pattern of durian plantation and production, for example in Thailand [8].

Studies of local durian in the Sumatera Island (Indonesia) have been carried out by some researchers such as in north Sumatera [9-11]. These studies examined the morphological characteristics and land suitability for durian plantation in North Sumatera (Indonesia). South Sumatera is famous for its local durian production which is spread across several areas. Among the many local durians in the South Sumatra, one of them is in the Lahat Regency. Therefore, this study aimed to identify physical and chemical characteristics of local durians in Lahat, specifically the *Kimisel*, *Naim* and *Caya* varieties.

2 Methods

2.1 Collection of durian fruit

Three varieties of local durians (*Kimisel*, *Naim*, *Caya*) were collected from Pagar Jati village, south Kikim sub-district. Those durians were harvested in June 2023. The ripe durian was selected by tapping the outer side of fruit with a knife. The inward sound of the durian indicates that the durian is ripe.

2.2 Physical measurement

The physical measurements included the weight of whole fruit, height, width, thickness of durian rinds, weight of flesh and seeds, and edible portion. The height and width of durian fruit as illustrated in Fig 1. The yellowness index of durian flesh was measured by using a colorimeter (NH310 High-Quality).

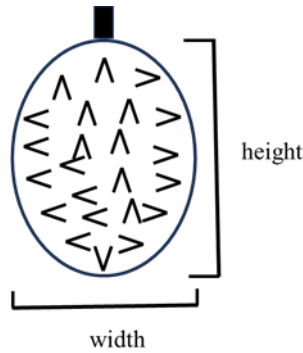


Fig. 1. The measurement of height and width of durian fruit.

2.3 Chemical measurement

The chemical measurements included vitamin C determination by titrimetric method based on iodimetry, water content using gravimetry method, ash content by using muffle furnace (Thermo Scientific, model FB1310M-33, Asheville, NC 28804 USA), fat content by using Soxhlet method, and protein by using micro Kjeldhal method.

3 Results and discussion

3.1 Physical measurement

There is no fixed form of local durian studied, however, they tend to be globose to oblong in shape and some are irregular. Idris [12] reported that Malaysian durian was in globose to ovoid or obovoid with color on the peel ranging from green to brown. The shape of *KimseI* and *Caya* varieties were similar (oblong), the difference is only the shape of the durian spines. The spines of the *KimseI* variety were sharper than those of the *Caya* variety. *Naim* variety is relatively small with globose shape. The thickest rind (1 to 1.1 cm) was found in *Caya* variety, followed by *KimseI* variety (0.9 to 1 cm) and *Naim* variety (0.7 to 0.8 cm). The yellowness of the durian flesh is often used as an indicator to show the good quality of durian flesh. The appearance of the yellowness of *KimseI*, *Naim* and *Caya* varieties are shown in Fig 2.



b) *Naim* variety

a) *Kimisel* variety



c) *Caya* variety

Fig. 2. The local durian varieties of *Kimisel*, *Naim* and *Caya*.

The physical measurement of these local durians was carried out on the total weight of whole durian fruit. The flesh appearance of the local durians is shown in Fig 3. The height and width as well as number of seeds and total weight of flesh and seeds are presented in Table 1. *Kimisel* and *Caya* varieties were almost in the same size, however *Caya* variety was heavier by 556 grams than the *Kimisel* variety. On the other hand, *Kimisel* variety had more seeds than the *Caya* variety.



Fig. 3. The flesh appearance of *Kimisel*, *Naim* and *Caya* varieties.

The yellowish color of the *Kimisel* variety flesh was more intense than that of *Naim* and *Caya* varieties (Fig 4). The color of the flesh of the *Kimisel* variety was more attractive than the others. *Caya* varieties had less seeds and more flesh than *Kimisel* varieties as presented in Table 1. There was more flesh in *Caya* variety which almost reached 1000 g per fruit surrounding approximately 15 seeds. The weight of whole durian fruit of *Kimisel*, *Naim* and *Caya* varieties are shown in Fig 5.

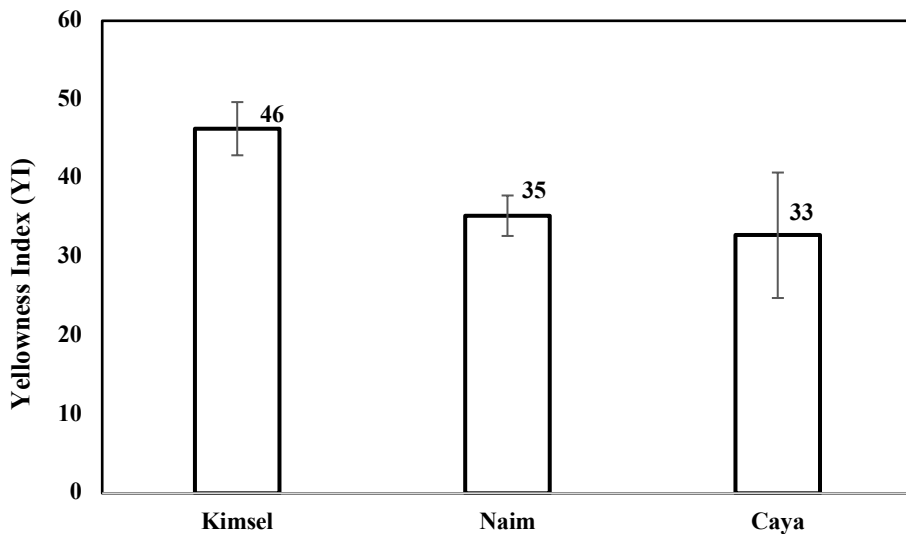


Fig. 4. The yellowness index of durian flesh of *Kimsel*, *Naim* and *Caya* varieties.

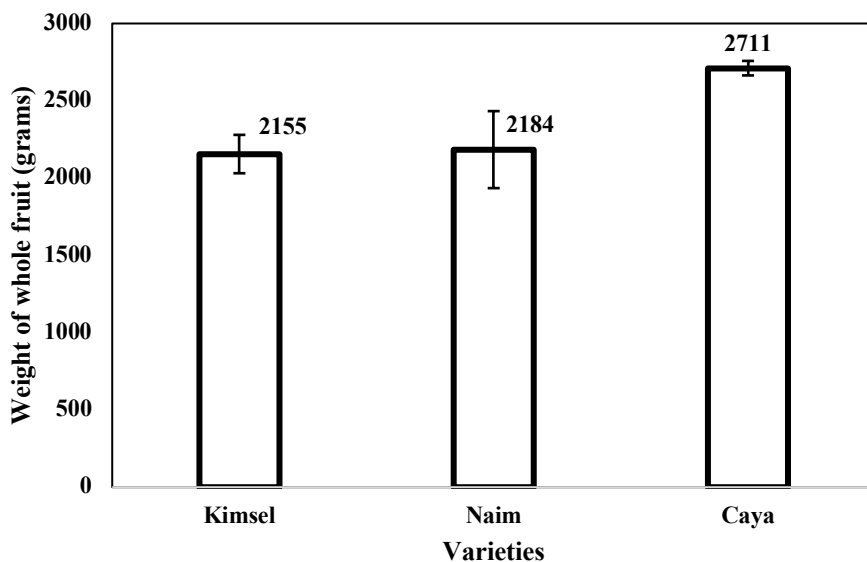


Fig. 5. The weight of whole durian fruit of *Kimsel*, *Naim* and *Caya* varieties.

Table 1. The height, width, number of seeds, weight of flesh and seeds and edible portion.

No.	Varieties	Height (cm)	Width (cm)	Number of seeds	Weight of flesh and seeds (grams)
1	<i>Kimsel</i>	21±1.41	17.78±0.24	19	901
2	<i>Naim</i>	19±1.15	18.15±1.13	12	740
3	<i>Caya</i>	21±1.44	17.68±1.54	15	966

3.2 Chemical characteristics measurement

The proximate analysis is shown in Table 2. The water content of the flesh of *Kimsel* variety was the highest among others, and this indicates the softer texture compared to *Naim* and *Caya* varieties. The water content of these local durians ranged from 63.25% to 70.73%. The water content is slightly higher than water content of *Monthong* Thailand durian which are in the range of 58% to 69% [13]. The fat content in the durian flesh was low, and the protein content ranged from 1.52 % to 2.32%, and the highest protein content was found in the *Naim* variety. The highest carbohydrate content was in the *Caya* variety followed by *Naim* and *Kimsel* varieties.

Table 2. Proximate analysis of *Kimsel*, *Naim* and *Caya* varieties.

No.	Varieties	Water content (%)	Ash content (%)	Fat content (%)	Protein content (%)	Carbohydrate content (%)
1	<i>Kimsel</i>	70.73	5.18	0.97	1.89	21.45
2	<i>Naim</i>	67.61	4.59	0.98	2.32	25.69
3	<i>Caya</i>	63.23	4.03	1.66	1.52	29.21

The protein content in durians of *Kimsel*, *Naim* and *Caya* varieties were relatively similar to the protein content in Malaysian durians as reported by Aziz and Jalil [14]. The fat content in these local durians was far lower than that of durians in Malaysia [14].

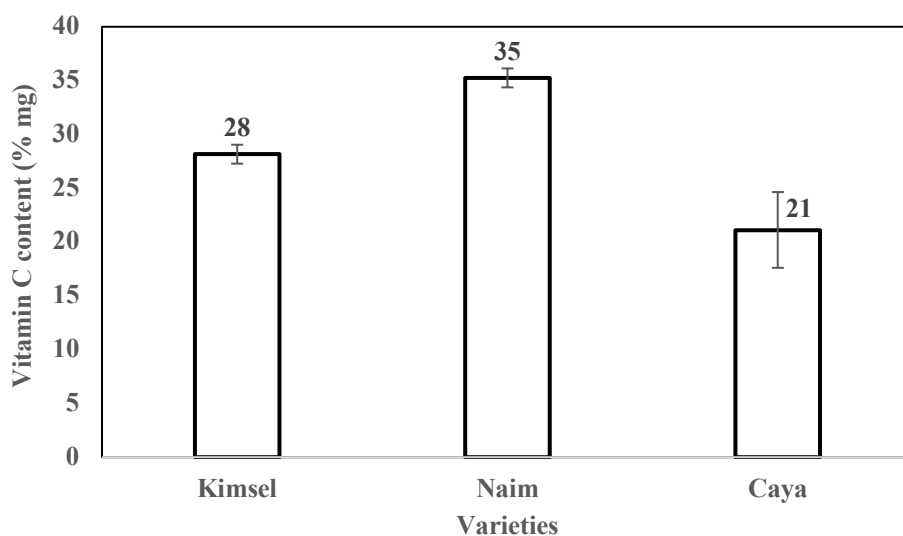


Fig. 6. The vitamin C of *Kimsel*, *Naim* and *Caya* varieties.

Figure 6 shows that the highest vitamin content (35 mg/100g) is in the flesh of Naim variety followed by Kimsel and Caya varieties. The vitamin C in durian contributes to the antioxidant activity in durian flesh. The antioxidant activity in durian flesh has been investigated by previous studies [7] [15] [16] [17] [18]). However, most of those studies focused on bioactive compounds other than vitamin C, such as polyphenols, flavonoids, anthocyanins.

4 Conclusion

The shape of local durian *Kimsel*, *Naim* and *Caya* varieties was globose to oblong. The highest yellowness index of durian flesh was found in Kimsel followed by Caya and Naim varieties. The texture of flesh from the Kimsel variety was softer than Naim and Caya varieties, which was indicated by the higher water content (70.73%). The fat content in these local durians was no more than 2%, protein content ranged from 1.5 to 2.3%, and vitamin C content ranged from 21 to 35 mg/100g. These physical and chemical properties can be used as basic information for durian consumers in choosing durian, especially local durian from Lahat district.

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