1.5125532.pdf

by

Submission date: 01-Sep-2021 04:21PM (UTC+0700)
Submission ID: 1639377081
File name: 1.5125532.pdf (554.32K)
Word count: 3432
Character count: 18309

Morphological-based diversity analysis of durian from Kundur Island, Indonesia

Cite as: AIP Conference Proceedings **2155**, 020028 (2019); https://doi.org/10.1063/1.5125532
Published Online: 06 September 2019

Noor Aini Habibah, Yustinus Ulung Anggraito, Muhammad Abdullah, Husni Ahmad Sidiq, Anggi Angeliena, Anang Ma'ruf, Fahrul Huyop, and Amin Retnoningsih

Morphological-Based Diversity Analysis of Durian from Kundur Island, Indonesia

Noor Aini Habibah[1, b)], Yustinus Ulung Anggraito[1, c)], Muhammad Abdullah[1, d)], Husni Ahmad Sidiq[1, e)], Anggi Angeliena[1, f)], Anang Ma'ruf[1, g)], Fahrul Huyop[2, h)] and Amin Retnoningsih[1, a)]

[1] Department of Biology, Universitas Negeri Semarang, Indonesia.
[2] Department of Biosciences, Faculty of Science, Universiti Teknologi Malaysia, UTM Johor Bahru, Malaysia

[a)]Corresponding author: aminretnoningsih2016@mail.unnes.ac.id
[b)]nooraini@mail.unnes.ac.id
[c)]y.ulung.anggraito@mail.unnes.ac.id
[d)]abdullah.m@mail.unnes.ac.id
[e)]husniahmadsidiq@gmail.com
[f)]anggiangeliena@gmail.com
[g)]anangmaruf186@gmail.com
[h)]fahrul@utm.my

Abstract. Kundur area in Kepulauan Riau, Indonesia is very well known for having many superior durian cultivars. It is foretold that most of durian plants on the island are originally grown from seeds developed from Malaysian durian. Superiorities of Kundur durian are differently unique in taste, texture and arylus colour. This study aimed to analyse the diversity of superior durian in Kundur using morphological properties and characteristics. Vegetative and generative phases of 30 durian cultivars were observed in five vegetative and seven generative properties. Characteristics that can be observed in each trait were transformed to scores then analysed using the NTSYS-pc 2.02 program to determine the level of similarity/diversity of Kundur durian cultivars. Results showed that similarity of Kundur durian cultivars ranged from 37-78% or had a diversity of 22-63%. There were no cultivars that showed 100% similarity. Based on the results of Pearson's correlation analysis, 30 of the 48 characteristics observed were positively correlated. Based on fruit characteristics that consumers like, 33.3% Kundur durian is preferred because it has an arylus thickness > 10 mm, 80% has a bittersweet taste, 26.7% arylus is dark yellow, and 77% arylus texture is soft and dry.

INTRODUCTION

Durian has high diversity due to their pollination system. This plant has open pollination system therefore the possibility of cross-pollination midst varieties is highly [1]. Indonesia has around 20 species from a total over 30 durian species in the world. About 18 species of durian are found in Kalimantan, 7 in Sumatra, others in Java, Bali, Nusa Tenggara, Sulawesi, Maluku and Papua only one species is found [2]. Durian can be found in almost all regions of Indonesia with diverse of characteristic. No fewer than 76 superior varieties resulting from indigenous selection were released by the Ministry of Agriculture through 2011. Several varieties distinguished are: Matahari (Bogor), Officers (Majalengka), Petruk (Jepara), Sitokong (Jakarta), Sunan (Boyolali), Breadfruit (Karanganyar), Ripto (Trenggalek), Copper (Kampar), Bakul (Muara Enim), Namlung Petaling (Bangka), Salisun (Nunukan), Sijapang (Karang Intan) and Aspar (Mabah) [3].

Kundur Island is durian paradise which produces high quality durians in Karimun, KEPRI. The government has developed superior durians in Karimun and Lingga [4]. Superior Durian Kundur Island has several superior characters, such as yellow, orange, reddish to rainbow aryls, fluffier (mild and droughty), sweet taste and sweet

Proceedings of the 2nd International Conference on Biosciences and Medical Engineering (ICBME2019)
AIP Conf. Proc. 2155, 020028-1–020028-10; https://doi.org/10.1063/1.5125532
Published by AIP Publishing. 978-0-7354-1900-1/$30.00

bitter slightly, small seed and flat (aryl 1.5 to 3 cm thick) therefore the edible portion is> 30%; hold storage and high productivity [5].

Genetic diversity knowledge is required to support the development of durian commodities. The success of plant breeding efforts is largely determined by extensive genetic diversity. The identification of durian diversity can be done through morphology [6], isozymes [7] and molecular identification [8,9,10]. Genetic similarities based on morphological characters have not been able to show kinship accurately, since morphological characters are strongly influenced by the environment and age of the plant. Yet, exploration and characterization based on morphological characters is the fastest and easy qualitative way to identify the diversity and genetic distance between plant accessions [11].

Study to reveal the diversity of eminent durian in Kundur Island has ne22 been done because it is obligatory to analyze diversity native superior durian of Kundur Island. Consequently, the objective of this study is to analyze genetic identity of superior durian in Kundur Island based on morphological characters.

METHODOLOGY

The selected regions in this study are West Kundur and Kundur, Kundur Island, Riau Islands Province (KEPRI). A total of 30 superior durian samples of Kundur Island were observed based on 48 morphological characters. In the West Kundur area 20 samples were taken (GSG, Cuhut, Angbak Tolo, Angbak Kia 11, Angbak Kia 03, Huang Kwue, Niam, Pheng Kwai, Angbak Ouhut, Te Lo Kha, Phang Jing Lien, HM, PKM, Pondok, GT, Tongkat, TR, Asapan, Mas Pear, Jongkong and KM). The total of 10 samples were taken from the Kundur area (Durian Tawa, Muong, Sampak, Stoppers, Coi, Empe, Milah, Tiaulo Angibak, Pekan and Layang).

A total of 41 indicators were observed in the generative phase, namely flower buds (oval, ovoid round, round, elongated or egg-lanceolate round), flower petals (oval, oval bells), crown colors (white, round cream, yellow or yellowish green), flower crown colour intensity, the edge of crown colour (pink, red or green), shape of crown (spatula, elongated, wide spatula or narrow spatula), broken fruit (no or yes), flowering habits (every year, irregular and twice a year), fruit shape (ovate, ovoid, ovoid long, oval, round, jorong latitude, elongated or long round), shape of fruit tip (pointed, convex, depressed like a breast or cut), base shape of fruit (convex, cut, depressed, necked, pointed or concave), base fruit stalk (<4 cm to >8 cm), complement fruit stalks (strong or weak), fruit stalk colour (brown or greenish brown), thorn in the fruit, spines on fruit (convex, pointy, cone, pyramid, convex or hooked), density of thorns (medium, rare or solid), long fruit spines (<1 cm to >1.5 cm), fruit weight (0.9 kg to 4.0 kg), fruit skin thickness (medium, thin or thick), fruit skin color (green, orange yellow, brownish green, green or yellowish green), fruit skin colour intensity (dark or bright), aryl thickness (0.6 cm to <5 cm), aryl texture (soft or medium), aryl water content (watery or not runny), percent fiber (low, medium or none), fruit flesh taste (sweet with bitter taste, sweet bitter or snazzy), fruit aroma (light, neutral or strong), flesh color (creamy white, lemon yellow, dark yellow or yellow), seed shape (ellipsoid, flat, elongated, ovoid, rounded and breech ovate) and seed coat colour (brown, brownish yellow, orange gray or black).

There are 7 vegetative characters, namely tree age, tree height, canopy tree shape (round, oblong, elliptical pyramid, semicircular or irregular), tree growth (intermediate, upright or diffuse), leaf shape (during, striped, ovate, elongated or round egg-lanceolate), the shape of the leaf tip (fanged, tapered, long tapered or pointed), and the shape of the base of the leaf (pointed, round, divided or dull).

Morphological observation data was modified in the form of scores which were then processed using the NTSYS-pc 2.02 program [12]. Then the data were presented in the form of a genetic similarity matrix using the Similarity for Qualitative Data (SIMQUAL) procedure. Th16 matrix was analyzed by Sequential Grouper Hierarchical and Nested (SAHN) grouping and clustering using the Unweighted Pair-group Method with Arithmetic Averaging (UPGMA) method.

RESULTS AND DISCUSSIONS

Kundur Island known produce of quality durian fruit in Karimun Regency, KEPRI. The diversity of durian on Kundur Island has yet to be discovered with certainty due to the lack of research on the diversity of durians on the Island. This study analyzed 30 samples of durian plants from Kundur Island based on 48 morphological indicators consist of 4 indicators related to tree character, 3 indicators related to leaves, 7 indicators related to flowers and 34 indicators related to fruits and seeds.

Tree character

The results of observing tree characters in 30 durian plants on Kundur Island are presented in Table 1.

TABLE 1 Morphology of tree durian plants on Kundur Island

Durian name	Tree Age (year)	Tree Height (meters)	Tree Head Shape	Tree Growth
GSG	30	15	rounded	intermediate
Cuhut	40	30	rounded	intermediate
Angbak Tolo	25	18	rounded	intermediate
Angbak Kia 11	30	20	Oblong	intermediate
Angbak Kia 03	40	25	Ellipse	intermediate
Huang Kwue Niam	20	20	Pyramid	spread
Pheng Kwai	28	15	rounded	intermediate
Angbak Ouhut	20	18	rounded	intermediate
Te Lo Kha	30	18	Pyramid	straight
Phang Jing Lien	30	18	half-round	intermediate
HM	15	10	Irregular	intermediate
PKM	30	15	Pyramid	intermediate
Pondok	30	25	Ellipse	intermediate
GT	16	10	Ellipse	spread
Tongkat	30	15	Irregular	spread
TR	18	20	Ellipse	intermediate
Asapan	16	15	Irregular	intermediate
Mas Pear	40	25	Oblong	spread
Jongkong	16	15	Pyramid	intermediate
KM	16	20	Ellipse	spread
Durian Tawa	30	20	Ellipse	straight
Moncong	20	15	Irregular	intermediate
Sampak	15	17	Pyramid	spread
Sumbat	20	20	Irregular	Intermediate
Coi	20	18	Oblong	Intermediate
Empe	20	15	Oblong	Straight
Milah	30	25	Pyramid	Intermediate
Tiaulo Angibak	25	20	Pyramid	Intermediate
Pekan	25	20	Ellipse	Intermediate
Layang	25	20	Pyramid	Intermediate

The analysis results of similarity based on morphological similarity coefficient matrix on tree characters between 30 durian accessions from Kundur Island shows that range of similarity values from 0.08 to 1.0. This data indicates the diversity of 30 durian accessions from Kundur Island by 0 to 92% (Figure 1). Durian plants from the West Kundur region as well as the Kundur area did not represent differences based on the region from tree characters. It is proved that the sample is not grouped by region. Based on tree characteristics, at 0.08 similarity index, Kundur Island durians divide into 2 large groups. Each group is divided into another several small groups.

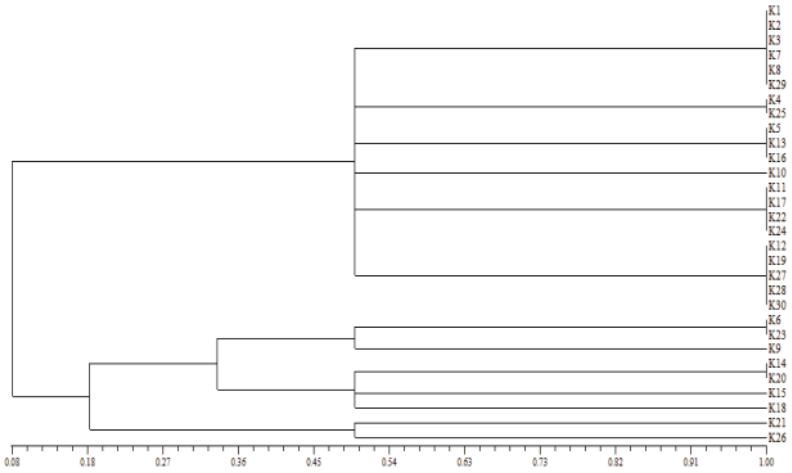

FIGURE 1 Dendrogram index of similarity of Kundur Island durian plants based on tree characters

Leaf character

The morphological data of durian leaves on Kundur Island is presented in Table 2. Three leaf characters are used in the observation, that are leaf shape, leaf tip shape, and leaf base shape. Kendur's Durian leaf forms are 36.7% are ellipse, 33.3% are elongated, and 30% are round and round lanceolate. Based on the leaf tip shape, 46.7 has a tapered shape, and 53.3% consists of a fanged, long, tapered shape. Whilst on the grounds of base leaf shape, 40% is round, 60% consists of a pointed, split and blunt shape.

TABLE 2 Morphology of leaves of durian plants on Kundur Island

Durian name	Form of Leaf Strands	Edge Leaves Shape	Form of Base Leaves
GSG	ellipse	Fangs	Taper
Cuhut	Striped - elongated	Tapered	Taper
Angbak Tolo	Round eggs	Fangs	Rounded
Angbak Kia 11	ellipse	Long Tapered	Divide
Angbak Kia 03	Striped - elongated	Fangs	Divide
Huang Kwue Niam	ellipse	Long Tapered	Divide
Pheng Kwai	Round eggs	Long Tapered	Rounded
Angbak Ouhut	Round eggs	Tapered	Divide
Te Lo Kha	ellipse	Long Tapered	Taper
Phang Jing Lien	elongated	Long Tapered	Rounded
HM	ellipse	Tapered	Divide
PKM	Round eggs	Taper	Rounded
PONDOK	Striped - elongated	Taper	Divide
GT	ellipse	Long Tapered	Divide
TONGKAT	ellipse	Tapered	Divide
TR	ellipse	Tapered	Blunt
ASAPAN	ellipse	Long Tapered	Rounded
MAS PEAR	Round eggs	Tapered	Blunt
JONGKONG	Round eggs	Tapered	Rounded
KM	Round eggs	Tapered	Rounded
Durian Tawa	elongated	Tapered	Rounded
Moncong	elongated	Tapered	Divide
Sampak	elongated	Tapered	Divide
Sumbat	elongated	Tapered	Rounded
Coi	elongated	Long Tapered	Rounded
Empe	elongated	Tapered	Rounded
Milah	Round eggs	Taper	Rounded
Tiaulo Angibak	ellipse	Taper	Taper
Pekan	Round egg - lanceolate	Long Tapered	Divide
Layang	ellipse	Tapered	Taper

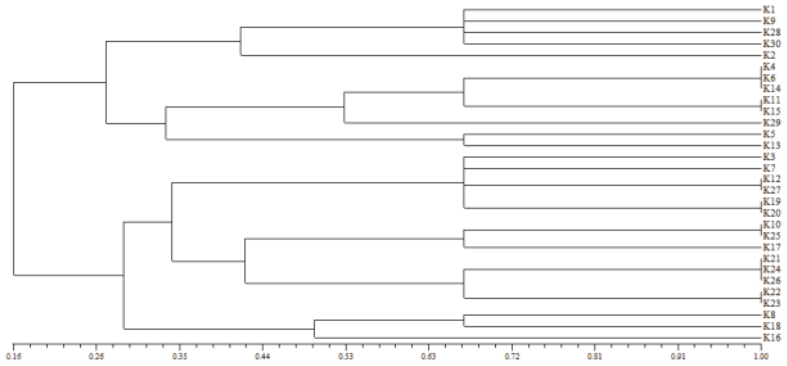

FIGURE 2 Dendrogram index of similarity of Kundur Island durian plants based on leaf characters

The results of the similarity analysis based on the morphological similarity coefficient matrix on leaf characters among 30 durian accessions from Kundur Island showed a range of similarities of 0.16-1.0. This proofs the diversity of leaf characters among 30 durian accessions from Kundur Island of 0 to 84% (Figure 2).

Flower character

The observed flower characters consist of 7 characters presented in Table 3.

TABLE 3 Flower morphology of durian plants on Kundur Island

Durian name	Flower bud shape	Flower petal shape	Number of crowns	Flower crown color	Crown Color Intensity	Color of Crown Edge	Crown shape
GSG	Oval round	Round eggs	5	White	Bright	Pink	Spatula
Cuhut	Round eggs	Round eggs	5	cream	Bright	Pink	Spatula
Angbak Tolo	Oval round	Oval round	5	cream	Bright	Red	Lengthwise
Angbak Kia 11	Round eggs	Oval round	5	Yellow	Bright	Red	Spatula
Angbak Kia 03	Round eggs	Oval round	5	Yellow	Bright	Pink	Lengthwise
Huang Kwue Niam	Round eggs	Oval round	5	Yellow	Bright	Green	Spatula
Pheng Kwai	Rounded	Round eggs	5	Yellow	Bright	Green	Spatula
Angbak Ouhut	Oval round	Oval round	5	Yellow	Bright	Green	Spatula
Te Lo Kha	Round eggs	Oval round	5	Yellow	Bright	Green	Spatula
Phang Jing Lien	Round eggs	Round eggs	5	Yellow	Bright	Green	Wide Spatula
HM	Round eggs	Bell	5	Yellow	Bright	Pink	Wide Spatula
PKM	Round eggs	Round eggs	5	Yellow	Bright	Pink	Spatula
Pondok	Round eggs	Round eggs	5	Yellowish green	Bright	Green	Wide Spatula
GT	Round eggs	Oval round	5	Yellowish green	Bright	Green	Wide Spatula
Tongkat	Rounded	Oval round	5	Yellowish green	Bright	Green	Spatula
TR	Rounded	Round eggs	5	Yellowish green	Bright	Green	Spatula
Asapan	Round eggs	Round eggs	5	Yellow	Bright	Green	Wide Spatula
Mas Pear	Rounded	Round eggs	4	Yellowish green	Bright	Green	Lengthwise
Jongkong	Round eggs	Round eggs	5	Yellowish green	Bright	Green	Wide Spatula
KM	Rounded	Oval round	5	Yellowish green	Bright	Pink	Wide Spatula
Durian Tawa	Lengthwise	Oval round	4	White	Bright	Pink	Spatula
Moncong	Oval round	Oval round	5	White	Bright	Pink	Narrow spatula
Sampak	Round eggs	Oval round	5	White	Bright	Pink	Narrow spatula
Sumbat	Round eggs	Oval round	4	White	Bright	Green	Spatula
Coi	Oval round	Round eggs	5	White	Bright	Green	Narrow spatula
Empe	Round eggs	Oval round	4	White	Bright	Green	Narrow spatula
Milah	Round eggs	Round eggs	4	White	Bright	Green	Narrow spatula
Tiaulo Angibak	Lengthwise	Oval round	5	White	Bright	Green	Spatula
Pekan	Round egg – lanceolate	Oval round	5	White	Bright	Green	Spatula
Layang	Round eggs	Oval round	5	White	Bright	Green	Spatula

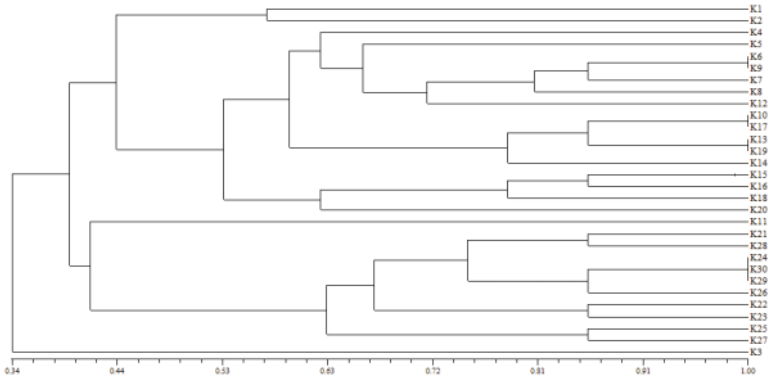

FIGURE 3 Dendrogram of the similarity index of Kundur Island durian plants based on flower characters

The similarity index of Kundur Island durian plants based on floral characters was found to be between 0.34-1.00, thus corresponding to a diversity of between 0 to 66% (Figure 3).

Fruit and seed characters

Table 4 presents the percentage of Kundur Island durian that fits the criteria of durian fruit that preferred by consumers. The criteria for durian fruit preferred by consumers from the research results of Santoso *et al*. [13] (2008) used as a reference.

TABLE 4 Percentage of Kundur island durian that matches the criteria of fruit that consumers preferred

Character Type	Criteria for durian that consumers like	Percentage of Kundur Island durian that matches the criteria favored by consumers (%)
Long thorns	Medium (11-15 mm)	90
Fruit size	Medium (1,6-2,5 kg)	53
Fruit skin color	Green brown	57
Smell	Strong	83
Color of fruit flesh	Dark yellow	26,7
Fruit texture	Soft dry / fluffy	77
Thickness of fruit flesh	Thickness (> 10 mm)	33,3
Taste of fruit flesh	Bitter sweet	80

The criteria for durian referred to a study by Santoso et al. (2008)

Based on the color of the flesh, Durian Kundur Island have colors that ranged from cream-white to dark yellow. The dark yellow colored fruit was preferred by only 26.7% of the consumers. Other colors include cream white colour (16.7%), pink (3.3%), but majority consumers preferred light yellow colored durian flesh (53.3%). While, based on the thickness of the fruit flesh, only 33.3% of Kundur Island durians had fruit flesh thickness that is favoured by consumers, namely fruit flesh with criteria of thickness (>10 mm). It was found that 56.7% of other durians on Kundur Island have flesh thickness ranging from 0.6-2 cm. Figure 4 represents the overall character, durian from Kundur Island has a degree of similarity ranging from 0.37 to 0.79. Handayani and Ismadi [14] reported that the character of fruit, the superior durian fruit of North Aceh has a similarity of spread from 0.43-0.80. This data shows that the durian fruit of Kundur Island has a higher diversity compared to the superior durian fruit of North Aceh based on fruit characteristics.

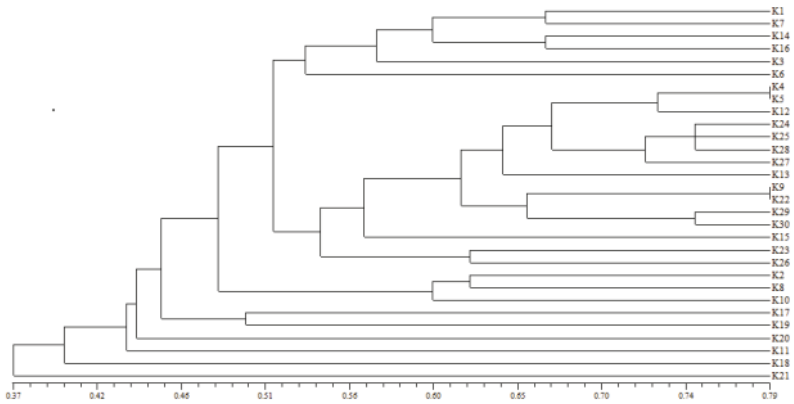

FIGURE 4 Dendrogram index of similarity of Kundur Island durian plants based on fruit and seed characters

Overall character

Analysis of the similarity index of Kundur Island durian plants based on 48 morphological characters is presented in Figure 5.

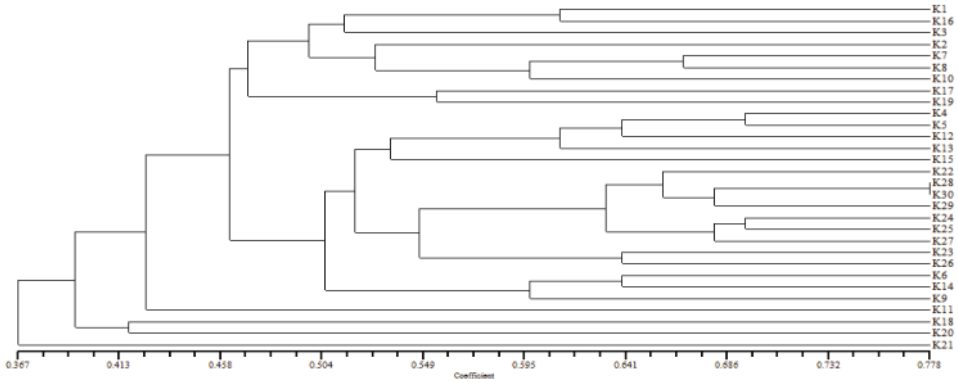

FIGURE 5 Dendrogram of the similarity of durian plants in Kundur Island based on 48 morphological characters

Based on 48 morphological characters, Kundur Island durian shows a similarity index between 0.37 to 0.78%. This data indicates the diversity of durian plants on Kundur Island based on morphological characters of between 22-63%. Baroroh *et al*. [15] reported that, based on morphological character markers, durian diversity in Kuantan Singingi Regency ranged from 36 to 65%. By virtue of morphological character markers, the diversity of durian in Kundur Island is lower than durian diversity in Kuantan Singingi Regency. With a similarity index of 0.37, Kundur Island durian can be divided into 2 groups. Group I is a large group which is then divided into several small groups. Group, I consisted of 29 durian samples from the West Kundur and Kundur regions. Group II only consisted of 1 sample, namely Durian Tawa from the Kundur area. Based on 48 morphological characters, Durian Tawa was different from the other 29 other durian accessions on Kundur Island. Tiaulo Angibak and Durian Layang show identical characters, as observed from the 48 morphological characters observed. Morphological features controlled by genetics inherited to next generation. This may be due to environmental factors that influenced the expression of these characteristics [16]. The results of the Pearson correlation represent that 30 characters from 48 characters observed were positively correlated with one another.

CONCLUSION

Based on 48 morphological characters of durian, Kundur Island durian was found to show similarity index between 0.37 to 0.78%. Durian Tawa is different from 29 other durian accessions on Kundur Island while, characters of the Tiaulo Angibak and layang Durian identical based on the observed 48 morphological characters. A total of 30 characters from 48 characters observed were positively correlated with one another.

REFERENCES

1. N. L. P. I. Indriyani, S. Hadiati, F. Nasution, Edison, Sudjijo, Y. Irawati. Journal of Fruit and Ornamental Plant Research **20(2)**, 23-33 (2012).
2. P. J. Santoso and A. Priyono. Iptek Hortikultura **11**, 31-37 (2015).
3. P. J. Santoso, Iptek Hortikultura **8**, 8-15 (2012).
4. Dikominfokepri. 2018
5. M. R. Tirtawinata, P. J. Santoso and L. H. Apriyanti, J. Agr. Tech. **7(4)**, 1107-1116 (2016).
6. S. Lestari, Fitmawati and N. N. Wahibah, Buletin Kebun Raya **14(2)**, 29-44 (2011).
7. K. A. N. Salasa, S. Ashari and N. Herlina, Jurnal produksi Tanaman **1(5)**, 427-433 (2013).
8. P. A. Riupassa, T. Chikmawati, Miftahudin and Suharsono. Makara J. Sci. **19(1)**, 27-36 (2015).
9. O. Vanijajiva, Procedia Eng. **32**, 155-159 (2012).
10. I. P. Ruwaida, Supriyadi and Parjanto, Nusantara Bioscience **1(2)**, 84-91 (2009).
11. I. Maskromo and Miftahorrachman. Jurnal Littri **13(4)**, 119-124 (2007).
12. F. J. Rohlf, NTSYS-pc. *Numerical Taxonomy and Multivariate Analysis System*, version 2.02. Setauket (Exeter Publishing, New York, 1993).
13. P. J. Santoso, Novaril, M. A. S. Jawal, T. Wahyudi dan A. Hasyim. J. Hort. **18(4)**, 395-401 (2008).
14. S. Handayani and Ismadi, J. Hort. Indonesia, **8(3)**, 147-154 (2017).
15. N. Baroroh, Fitmawati and N. Sofiyanti, 014. JOM FMIPA **1(2)**, 1-7 (2014).
16. H. Suskendriyati, N. Wijayati, D. Hidayah and Cahyuningdari. Biodiversitas **1(2)**, 59-64 (2000).

1.5125532.pdf

ORIGINALITY REPORT

13%	10%	9%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	jcep.iaut.ac.ir Internet Source	1%
2	kms.mipa.unnes.ac.id Internet Source	1%
3	Nurhaziqah Supari, Yilmaz Kaya, Maral Biroudian, Muhammad Arshad Javed. "Molecular characterization of Malaysian rice cultivars using SSR markers", AIP Publishing, 2019 Publication	1%
4	Untoro Nugroho, Samsudin Anis, Rini Kusumawardani, Ahmad Mustamil Khoiron et al. "Frame analysis of UNNES electric bus chassis construction using finite element method", AIP Publishing, 2018 Publication	1%
5	www.scribd.com Internet Source	1%
6	repository.usu.ac.id Internet Source	1%

7	Francisco Elegado, Charisse Leanne Legaspi, Joseph Martin Paet, Florabelle Querubin et al. "Screening, identification and optimization of extracellular lipase production of yeast (Cryptococcus flavescens) isolated from a tree canopy fern in the Mount Makiling Forest Reserve, Philippines", AIP Publishing, 2019 Publication	1 %
8	www.uoguelph.ca Internet Source	1 %
9	eprints.utm.my Internet Source	1 %
10	Submitted to Einstein High School Student Paper	1 %
11	diabetes101site.net Internet Source	<1 %
12	pt.scribd.com Internet Source	<1 %
13	Www.mdpi.com Internet Source	<1 %
14	sinta3.ristekdikti.go.id Internet Source	<1 %
15	Limin Xue, Liu Tang, Juanjuan Zhao, Zhenjuan Fang, Hanxu Liu, Jianjun Qiao, Guishan Zhang. "Bacillus salipaludis sp. nov., isolated from	<1 %

saline–alkaline soil", Archives of Microbiology, 2021
Publication

16	www.tandfonline.com Internet Source	<1 %
17	A. Camerlenghi. "Geophysical evidence of mud diapirism on the Mediterranean Ridge accretionary complex", Marine Geophysical Researches, 04/1995 Publication	<1 %
18	spatula.cheap-if.com Internet Source	<1 %
19	Ni Luh Putu Indriyani, Sri Hadiati, Fitriana Nasution, Edison Sudjijo, Yulia Irawati. "Maternal and Paternal Effect on the Characters of Durian (Durio Zibethinus Murr.) Fruit from Cross-Pollination", Journal of Fruit and Ornamental Plant Research, 2012 Publication	<1 %
20	P Kricella, M M Pratamaningsih, R E Subandiono. "Properties of soils from different landform and parent material in Kundur Island, Kepulauan Riau Province", IOP Conference Series: Earth and Environmental Science, 2021 Publication	<1 %
21	docplayer.net Internet Source	

		<1%
22	www.scipress.com Internet Source	<1%
23	"Mineralogical chemistry", Journal of the Chemical Society, Abstracts, 1884 Publication	<1%
24	Yuli Utanto, Ghanis Putra Widhanarto, Yoris Adi Maretta. "A web-based portfolio model as the students' final assignment: Dealing with the development of higher education trend", AIP Publishing, 2017 Publication	<1%

Exclude quotes	On	Exclude matches	< 3 words
Exclude bibliography	On		