



Inventory of the *Citrus* in Barimbun Village, Tabalong District

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Abstract

Indonesia is rich in flora diversity, especially fruit plants. One of fruit plants that is familiar to Indonesian people is the orange tree. Orange trees are annual plants originating from the Asian continent, especially India to China. In Indonesia, orange plants are diverse and have unique characteristics in the form of aroma, color and taste that are different from other fruits. The aim of this research is to describe the diversity of citrus plants (genus *Citrus*) in Barimbun Village, Tabalong. This research uses the line transect method. The research results found 7 types of oranges, namely, *Citrus microcarpa*, *Citrus jambhiri*, *Citrus aurantifolia*, *Citrus gaudis*, *Citrus hystrix*, *Citrus sinensis*, and *Citrus limon*. Moreover, the abiotic factors give good value which means a suitable habitat for oranges. From this study, it may conclude that Barimbun Village, Tabalong District is a suitable habitat for orange plant because this area has enough amount of rainfall and stabil temperature.

Keywords: *Citrus*; inventory; plantae; Tabalong

INTRODUCTION

Indonesia is a tropical country because it has two conditions, namely the rainy season and the dry season. Its location near the equator means that this country always gets sunlight, thus providing benefits for soil fertility. The condition of this region makes Indonesia rich in flora diversity, especially fruit plants (Palupi & Suneth, 2016; Fuka *et al.*, 2018; Izzalqurny *et al.*, 2022). One fruit plant that is familiar to Indonesian people is the orange tree. Orange trees are annual plants originating from the Asian continent, especially India to China. In Indonesia, orange plants are diverse and have unique characteristics in the form of aroma, color and taste that are different from other fruits. Citrus plants contain many benefits, namely as anti-oxidants (Palupi, 2017; Fitriana & Fitri, 2020; Sriarumtias & Auliasari, 2020). Oranges (*Citrus* sp.) are fruit products that have relatively large market potential and high economic value, and can grow both in tropical and subtropical areas. Oranges mostly grow on dry land, can grow in the lowlands and highlands, in tidal areas and can be planted in Sorjan (Adelina *et al.*, 2017; Yulianti *et al.*, 2020; Zamzamiyah & Ashari, 2020). Differences in the habitat of a plant will cause differences in the diversity of species that grow. Likewise with highland areas in Tabalong Regency, for example Barimbun Village, Tanta District. In the Barimbun Village area, Tanta District, there are quite a lot of types of oranges.

The highland area in Tabalong Regency is like in subtropical areas where temperatures usually do not drop below freezing and there is a moderate amount of rainfall. Oranges are a *Citrus* fruit that are highly nutritious and can provide a range of essential nutrients needed for optimal health. Oranges are an excellent source of vitamin C, which is a powerful antioxidant that helps to protect the body against damage from harmful free radicals. This powerful vitamin increases protection against infections and has healing properties as well as high antioxidant protection power. Then, consumption of 100% orange juice has been positively associated with nutrient adequacy and diet quality, with no increased risk of overweight/obesity in children; however, no one has examined these factors in adults (Neves *et al.*,

2011; O'Neil *et al.*, 2012).

The diversity of plants that exist in an area is local potential that can be developed, local potential is the wealth of an area that can be utilized in learning as independent learning material for students (Prabowo & Nurmiyati, 2016; Khovia, 2021; Destiara *et al.*, 2022). Biology learning is mainly locally based which is related to living creatures, both flora and fauna, for example in the Plantae sub-learning. Plantae (plant world) is a type of biological material that has a complex series of materials. Understanding of plant material needs to be concreted by studying it from the natural environment (Khalik *et al.*, 2016; Hanifah *et al.*, 2020; Khovia, 2021). Learning biology in the Plantae sub-concept would be good for students to see the learning material objects directly, therefore places with lots of plants and the surrounding environment can be a potential Plantae learning source choice. So the aim of this research is to inventory orange plants in the Barimbun Village area, Tanta District.

METHOD

The research was carried out in Barimbun Village, Tabalong Regency, South Kalimantan Province, which was carried out in March 2023. Data collection on *Citrus* diversity was carried out using the line transect method, namely by walking through the area along a predetermined transect (Hidayat *et al.*, 2017). This research was carried out on two the central area is the outermost area and the inner area whose point is the road, the total length of the road is ± 6.95 km where samples are taken 20% of the total. Data collection was carried out based on direct encounters with orange trees, the type, number of individuals and morphological characteristics of the plants that were found were then recorded. The data taken is primary data, namely type and quantity, secondary data, namely data obtained from literature studies and abiotic parameter data in the form of air temperature, air humidity, soil moisture, soil pH, wind speed, light intensity and altitude. The orange plants found were identified using an identification book entitled Florida *Citrus* Diagnostic Guide.

Tree morphology was observed as tree shape (ellipsoid, spheroid, obloid), density of branches (sparse, medium, dense), tree growth habit (erect, spreading, drooping), branch angle (narrow, medium, wide), spine density (absent, low, medium, high), spine shape (curved, straight, green, purple). Leaf morphology was recorded as leaf division (simple, bifoliate, trifoliate, pentafoliate), intensity of green color (light, medium, dark), leaf lamina attachment (sessile, brevipetiole), leaf lamina length (mm) recorded from petioles base to lamina tip), lamina width (mm) recorded at the widest point, leaf lamina shape (elliptic, ovate, obovate, lanceolate, orbicular, obcordate), leaf lamina margin (crenate, dentate, entire, sinuate), leaf apex (attunate, acuminate, acute, obtuse, round and emarginate), petiole wings (absent / present) and petiole wings width (narrow, medium, broad) (Jaskani *et al.*, 2006).

Fruit characteristics were studied as fruiting season (early, mid, late), fruit weight (g), fruit diameter and length (mm, average diameter/length of five fruit was recorded), fruit shape (speroid, ellipsoid, pyriform, oblique, obloid, ovoide), shape of fruit base (necked, convex, truncate, concave, collarade), fruit skin (green, green yellow, yellow), fruit surface texture (smooth, rough, papillate, pitted), adherence of albedo (weak, medium, strong), albedo color (greenish, white, yellow, pink), fruit attachment to stalk (weak, medium, strong), number of segment (average of five well developed segment were noted), adherence of segment walls (weak, medium, strong), segment shape uniformity (no, yes), thickness of segment wall (thin, medium, thick), fruit axis (solid, semi solid, hollow), pulp color (white, green, yellow, orange), pulp texture (crispy, fibrous, fleshy), vesicle length (short, medium, long) and juice content in endocarp (low, medium, high). Seeds characteristics were observed as seed shape (fusiform, clavate, ovoid, spherical, cuneiform), seed number per fruit (average of five fruit was recorded), seed surface (smooth, wrinkled, hairy), seed color (white, yellowish, creamy, green, brown), cotyledon color (white, light yellow, green, dark green, brown) and seed embryony (monoembryonic, polyembryonic, mixture of both) (Jaskani *et al.*, 2006).

RESULT AND DISCUSSION

Based on the results of research in Barimbun Village, Tabalong Regency, South Kalimantan Province, 7 oranges species were found with a total of 52 individual trees. The 7 orange species found are chili oranges, kuit oranges, limes, grapefruits, kaffir limes, sweet oranges, and lemons. The observation results can be seen in table 1.

Table 1. Types of oranges found in Barimbun Village

No	Species Code	Vernacular Name	number of individuals
1	Species 1	Limau Sambal, Jeruk Kasturi	13
2	Species 2	Limau Kuit, Jeruk Kuit	7
3	Species 3	Limau Nipis, Jeruk Nipis	13
4	Species 4	Limau Bali, Jeruk Bali	4
5	Species 5	Limau Purut, Jeruk Purut	6
6	Species 6	Limau Manis, Jeruk Manis	4
7	Species 7	Lemon	5

The classification of *Citrus* types uses the literature Steenis (2013), Backer & Brink (1965) and Sarwono (1997) as follows:

Plant classification:

Kingdom : Plantae
division : Magnoliophyta
class : Magnoliopsida
Subclassis : Rosidae
order : Sapindales
Family : Rutaceae
Genus : *Citrus*

Seven types of *Citrus* found in the study area based on morphological characteristics seen from roots, stems, leaves, fruits and flowers with the description.

1. Limau Sambal (*Citrus microcarpa*)

Data collection in the field, *Citrus microcarpa* has the characteristics of a herbaceous plant, the roots of this plant have a taproot system, with the nature of the roots growing towards the middle of the earth which are dark brown in color. The orange stem chili has a height ranging from 6.3 – 7.4 m, has sympodial branches and a rough surface and is green-brown in color. *Citrus microcarpa* is a true fruit with a single flesh, green when young and yellow when ripe. The morphology of *Citrus microcarpa* can be seen in Figure 1.



Figure 1. *Citrus microcarpa* Morphology

(Source: Masriana, 2023)

2. Limau Kuit (*Citrus jambhiri*)

Based on field collection data, lime kuit is a herbaceous plant with a taproot system that is brown in color, and grows towards the center of the earth. This orange stem has a height ranging from 5.5-6.7 m which is round in shape with a sympodial branch type, dark brown in color, the direction of growth of this orange grows upright. On the stem of this *Citrus* fruit there are sharp thorns. This *Citrus* fruit is classified as a single fleshy true fruit, the fruit is round, which is green in color, the surface of this *Citrus* fruit is wrinkled or wavy. The morphology of *Citrus jambhiri* can be seen in Figure 2.



Figure 2. *Citrus jambhiri* morphology
(Source: Masriana, 2023)

3. Limau Nipis (*Citrus aurantifolia*)

Based on data collection in the field, this plant is a shrub, with a root system consisting of brown taproots, these orange roots grow towards the center of the earth. This orange stem has a height with a range of 6.3 m - 7.4 m, with a monopodial branching type. This orange stem has a brown color with an upward growth direction, this orange stem has thorns on the stem and branches. This *Citrus* fruit is classified as a true fruit with a single flesh, the fruit is round in shape with yellow-green flesh. The morphology of *Citrus aurantifolia* can be seen in Figure 3.



Figure 3. *Citrus aurantifolia* morphology
(Source: Masriana, 2023)

4. Limau Bali (*Citrus grandis*)

Based on field data, *Citrus grandis* is a herbaceous plant with a brown taproot system, growing towards the center of the earth. This orange stem has a height ranging from 5.6- 6.4 m which is round in shape with a simpodial branching type, has a slightly whitish brown color, the direction of growth of this orange grows upwards. There are thorns on the trunk and branches. This round-shaped *Citrus* fruit is classified as a true fruit with a single flesh, the fruit is round, green in color, and inside the fruit there is a thick and whiteskin. The morphology of *Citrus grandis* can be seen in Figure 4.



Figure 4. *Citrus grandis* morphology
(Source: Masriana, 2023)

5. Limau Purut (*Citrus hystrix*)

Based on field data, *Citrus hystrix* is a herbaceous plant with a brown taproot system, growing towards the center of the earth. This orange stem has a height ranging from 2.1- 9.2 m which is round in shape with a simpodial branching type, has a slightly whitish brown color, the direction of growth of this orange grows upwards. On the stem of this *Citrus* fruit there are sharp thorns. This *Citrus* fruit is a single fleshy true fruit, the fruit is round, green in color, the surface of this *Citrus* fruit is wrinkled or wavy. The morphology of jeruk purut can be seen in Figure 5.



Figure 5. Morphology of *Citrus hystrix*
(Source: Masriana, 2023)

6. Sweet orange (*Citrus Sinensis*)

Based on data collection in the field, this species is a shrub with a taproot system that is brown in color, with the direction of growing towards the center of the earth. This orange stem has a height ranging from 1.9 – 2.3 m which is round in shape with a sympodial branching type, brown in color, the direction of growth of this orange grows upwards. On the stems and branches of this *Citrus* fruit there are sharp thorns. This *Citrus* fruit is classified as a true fruit with a single flesh, the fruit is round in shape, slightly yellowish green in color. The morphology of *Citrus Sinensis* can be seen in Figure 6



Figure 6. Morphology of *Citrus Sinensis*
(Source: Masriana, 2023)

7. Lemon (*Citrus limon*)

Based on data collection in the field, *Citrus limon* is a herbaceous plant with a taproot system that is brown in color, and grows towards the center of the earth. This orange stem has a height ranging from 0.7-1.8 m which is round in shape with a sympodial branching type, brown in color, the direction of growth of this orange grows upwards. On the stem of this *Citrus* fruit there are sharp thorns. This *Citrus* fruit is classified as a true fruit with a single flesh, the fruit is buni-shaped, green when it is young and pale yellow when it is ripe. The morphology of *Citrus limon* can be seen in Figure 3.1.7



Figure 7. Morphology of *Citrus limon*
(Source: Masriana, 2023)

Environmental conditions are one of the factors that greatly affect the state of plants in a habitat. These environmental conditions can be identified by measuring environmental quality parameters. The results of observations and measurements of environmental parameters that have been carried out in the sampling area of Barimbun Village can be seen in Table 2.

Table 2. Results of measuring abiotic environmental parameters in Barimbun Village

No.	Parameters and units	Measurement rangeli	Literature
1	Air temperature (⁰ C)	29-31	25-38 ⁽¹⁾
2	Air humidity (%)	62 % - 75%	50-80% ⁽¹⁾
3	Soil moisture (%)	72% - 80%	70-80% ⁽³⁾
4	Soil pH	6 – 6,8	5-7 ⁽¹⁾
5	Wind velocity (m/s)	0,0 – 1,4	40% ⁽⁴⁾
6	Light intensity (lux)	475 – 19.720	Terang
7	Place altitude (m.dpl)	44	0-1000 m dpl ⁽³⁾

(1) Nia, (1993)

(2) Fauzi, (2012)

(3) Endarto & Martini, (2016)

(4) Rahayu, (2011)

The results of environmental parameter measurements in Barimbun Village, Tabalong Regency, show that the air temperature is in the range of 29-31⁰C, air humidity is in the range of 72-80% and soil moisture is in the range of 72-80%, soil pH is in the range of 6-6.8. While the wind speed ranges from 0.0 – 1.4 m/s, and the light intensity in the area ranges from 475- 19,360 lux, with an altitude of 44 m dpl. Some of the physical factors measured will affect the life of *Citrus* plants. The seven types of oranges found to be able to grow in the research area were due to habitat factors that were suitable and supportive for growth and the availability of appropriate resources for orange plants. *Citrus* plants have adaptations to environmental conditions, especially in the lowlands and highlands. Oranges can grow well in tropical and subtropical areas, can adapt well in tropical areas at an altitude of 900-1200 m above sea level, and the air is always humid and requires air (Adelina *et al.*, 2017; Yulianti *et al.*, 2020; Zamzamiyah & Ashari, 2020).

CONCLUSION

Based on the results of research conducted in Barimbun Village, Tabalong Regency, South Kalimantan Province, 7 species of *Citrus* were found, namely *Citrus microcarpa*, *Citrus jambhiri*, *Citrus aurantifolia*, *Citrus gaudis*, *Citrus hystrix*, *Citrus sinensis*, and *Citrus limon*. It means Barimbun villahe, Tabalong District has suitable habitat for various oranges. In addition, Barimbun Village, Tabalong District has enough amount of rainfall and stabil temperature. This study also enrich the orange biodiversity data and show the characteristic that match to maintain this plant. Finally, I hope this research is useful for local use and the nation, especially student, teacher, lecturere, and researchers because it can be used as a reference for further research. Perhaps they can explore more oranges diversity in this area.

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