Characterization of mango (*Mangifera indica* L.) blungko from Rembang, Central Java

**Intan Gilang Cempaka**, Afrizal Malik, Arif Susila and Andi Dirpan

1. **Introduction**

Mango (*Mangifera indica* L.) is one of the choicest fruits in the world [1,2]. It belongs to the family of Anacardiaceae, one of the most important species of the family. It is also one of the most preferential fruit crops of the world’s tropical and subtropical regions for human consumption [3]. Due to its popularity and importance, *M. indica* is often named “King of fruits” for its luscious flavour and taste. Its social and economic impact are most relevant in developing and emerging countries, where mango is a high-valued component in the diet, rich in vitamins and minerals [4]. *Mangifera indica* has been an important component of the Ayurvedic and indigenous medical systems for over 4000 years [1,5].

There are over 1,000 named mango cultivars throughout the world, which are divided into two road classes: Indochinese and West Indian [6,7]. The Indochinese group is characterized by flattened, kidney-shaped, a bit elongated fruit with light green or yellow skin and little or no red blush colour. On the other hand, the West Indian cultivars are more rounded and plump and generally have a bright red blush colour. It should be emphasized that many cultivars are products of breeding and genetic improvement practices [8].

*Mangifera indica* occupies a unique position among edible fruit crops in Indonesia as it grows in all ecological zones of the country. Mango cultivars in Indonesia are often distinguished by their fruit characteristics and therefore assigned common names. The common varieties are the Gedong Gincu, Manalagi, Alpukat, Apel, Golek, Malibu, Madu, Kweni, Cengkir. However, information on the exact number of cultivars in Indonesia has not been accurately documented, leading to a lack of accurately
named germplasm and cultivars. Hence, this study aims to assess and characterize the cultivars of Mango Blungko from Rembang employing a morphological approach.

2. Materials and methods
The study was conducted in October 2018 in the village of Kebloran, Kragan district, Rembang. One mother tree cultivar of mango Blungko was used in this study. Fresh leaves and fruits were collected. Leaves from the cultivar were plucked freshly from the trees and were examined for morphometric analysis. Determination of morphology and plant character is carried out visually. Furthermore, identification is made of the type (Genus, Species, local name, Indonesian name, Latin name). Identify the morphological characters applied include habitat, plants, leaves, flowers.

Characterization of Mango Blungko was carried out based on the instructions for the description of horticultural plants by the Directorate General of Horticulture [9]. Color determination uses the Royal Horticulture Society color chart [10]. To obtain information about Mango Blungko and its distribution area, secondary data was collected through interviews with key informants, plant owners, farmer groups, village heads and PPLs. Plant documentation is done using a camera for observation data.

3. Results and Discussion
The genus Mangifera belongs to the order Sapindales in the family Anacardiaceae, which is a family of mainly tropical species. The mango tree is a large, spreading evergreen with a dense crown. Mature trees can attain a height of 4,5 m or more, with a 60-120 cm trunk and greyish-brown, longitude fissured bark.

| Group determination | Description                  |
|----------------------|------------------------------|
| **Taxonomy**         |                              |
| Domain               | Eukaryota                    |
| Kingdom              | Plantae                      |
| Phylum               | Spermatophyta                |
| Subphylum            | Angiospermae                 |
| Class                | Dicotyledene                 |
| Order                | Sapindales                   |
| Family               | Anacardiaceae                |
| Genus                | Mangifera                    |
| Species              | Mangifera indica             |
| **Characters**       |                              |
| Tree height          | 4.5 m                        |
| Circumference tree trunk | 186 cm                  |
| Canopy shape         | Symmetrical                  |
| Canopy               | E-W : 6.6 m; N-N : 9 m       |
| Tree trunk shape     | Round                        |
| Tree branch          | Curved upward                |
| Location of the lowest branch | 1.2 m                |
| Trunk texture        | Coarse                       |
| Trunk color          | Brownish (199 C)             |
| Tree canopy          | Shady                        |

Mango Blungko tree is leafy. Table 1 shows that the morphology and character of the Blungko in Rembang, is the same as Mangifera indica whose description has been declared by (10). They feature a rounded and symmetrical canopy, erect and open, and getting a pyramidal shape. At the present
study, the evaluated Blungko trees were considered short (≤ 6 m), with sparse foliage density and presented, predominantly, a semi-vertical progression. This growth habit greatly simplifies orchard maintenance and bring further advantages such as increased lighting and aeration of the canopy, stimulating higher productivity [11].

Table 2. Character and color of Mango Blungko leaves and flowers that grow in Rembang.

| Group determination | Description |
|---------------------|-------------|
| **Leaves**          |             |
| Leaf shape          | Symmetrical |
| Leaf edge           | Wavy        |
| Notches             | Notched and Pinnate |
| Leaf tip            | Acute       |
| Young leaf color    | Green (137 B) |
| Old leaf color      | Mild green (N170 D) |
| Bottom leaf color   | Dark Green (137 B) |
| Upper leaf color    | Purplish (NN 137 A) |
| Leaf type           | Lanceolate  |
| Leaf direction      | Semi-erect  |
| Leaf width          | 5.5 - 6.9 cm |
| Leaf length         | 26.8 – 35.2 cm |
| Petiol size         | 3.5 - 8.9 cm |
| Number of leaves/stalks | 7-10       |
| Distance between leaves | 2.8-5.5 cm |
| **Flowers**         |             |
| Flower color        | Reddish yellow |
| Stem color          | 63 B        |
| Flowe stand         | Tip         |
| Flower length       | 25-30 cm    |
| Flower/bunch        | 33-77       |
| Petal color         | White (N144 D) |
| Flowering duration  | 1 week      |
| Number of stamens   | 2           |
| Number of pistils   | 1           |
| Crown color         | Red (58 B)  |

The leaves from Mango Blungko were classified as simple (leaf blade is not divided), incomplete (with no sheath), petiolar-with petioles 3.5-8.9 cm. The leaf position on the branch proved to be semi-erect in the appraised plants, being straight the petiole insertion into the branch. Pulvinus showed thin in relation to the whole petiole. Leaves were depicted as lanceolate, presenting sharp angles (acute) at the base and apex of. The leaf length and width were, on average, respectively 26.8-35.2 cm and 5.5-6.9 cm. The data concerning the measures of the predominant leaves showed in close association with those found by Laroussilhe F et al. (2020), for other cultivars, with leaf length ranging from 150 to 400 mm and leaf width ranging from 15 cm to 40 mm [12]. The leaf length/width ratio 4.87-5.10 at the present study. Mature leaves were considered coriaceous in texture, free of pubescence and presented a mild fragrance when crushed.

As previously found for Mangifera indica, leaf color brownish or purplish when plants are young and acquires a dark green color as it develops and become mature [11]. Indeed, young leaves from Mango Blungko showed a purplish coloration that vanished as the leaf stretched. Also, for this cultivar, the green color intensity of the mature leaf blade was dark, with RHS Color chart on 137 B.
Most mango cultivars will flower multiple times each year under the proper environmental cues. In these cases, Mango Blungko flowers multiple times each year as well. The inflorescence of Mango Blungko can reach full bloom from the time of flower initiation in 25-30 days. The inflorescence is rigid and erect, up to 30 cm long, and is widely branched, tertiary, although the final branch is always cymose. It is usually densely flowered, and the flowers are either male or hermaphrodite, both borne within a single inflorescence. Mango Blungko has a reddish yellow color. Table 2 shows that the morphology and character of the Blungko in Rembang, it is the same as *Mangifera indica* whose description has been declared by CABI (2020) [12] The panicles consist of male and perfect hermaphrodite flowers. It has 2 stamens and 1 pistil, red (58 B) crown color, and has a flowering duration 1 week. To complete the determination data, the following photos of Mango Blungko in Rembang are included (Figure 1).

![Mango Blungko images](image)

**Figure 1.** Parts of the Mango Blungko plant (from left to right): (a) tree; (b) leaves; (c) fruit, (d) flesh and (e) seed.

| Group determination | Description          |
|---------------------|----------------------|
| **Fruits**          |                      |
| Type                | Flate                |
| Shape               | Obovoid              |
| Length              | Smooth               |
| Width               | 15-20 cm             |
| Length              | 5-10 cm              |
| Fresh weight        | 300 – 700 gram       |
| Skin color          | Yellowish Red        |
| Flesh color         | Yellowish Red        |
| Thickness           | 3 cm                 |
| Taste               | Sweet, sour          |

Table 3. Character and color of Mango Blungko fruit that grows in Rembang.
Mature trees from Mango Blungko showed medium to high fruit-bearing intensity. The evaluated fruits showed morphological characteristics 15-20 cm for longitudinal diameter and 5-10 cm for transverse diameter. The average fresh weight of 300 – 700 gram (Table 3) characterizes Mango Blungko as a cultivar of small fruits, which discourages its acceptance in the market. The skin and flash has a yellowish red color, and have a sweet and sour taste with a stimulating aroma. Further, the fruits had an obovoid shape, with an obtuse apex. The slope of the fruits ventral shoulder ended in a long curve and, in the apical portion. The fruit stalk insertion was vertical, with minor latex release when detaching it, and the bond strength between stalk and fruit was moderate. The depth of the fruit stalk cavity was considered shallow.

Recently, Mango Blungko has received a certificate of ownership on behalf of the Mayor of Rembang with registration number 795/PVL/2018 on the 9th November 2018. Mango Blungko has its distribution area in Kragan, Rembang Regency.

4. Conclusion
The conclusion of this research is that Mango Blungko grows in Kragan, Rembang Regency has unique and distinctive as local mango variety. Therefore, it has a promising economic value, then Mango Blungko has been patented as a local plant typical of Rembang Regency.

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