



## POSTHARVEST OPERATIONS, MATURITY INDICES, AND DEFECTS OF CARABAO AND PICO MANGO (*Mangifera indica* Linn.) IN THE PHILIPPINES

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### Executive Summary

Mango (*Mangifera indica* Linn), the national fruit of the Philippines, is a low-calorie fruit with high nutritional value (Mabalot, 2021; United States Department of Agriculture [USDA], 2016). It is the third most exported fruit crop in the country next to banana and pineapple, but production has declined steadily in recent years (Department of Agriculture-High Value Crops Development Program [DA-HVCDP], 2022). This is due to several factors, including pests and diseases, high production costs, and postharvest losses (DA-HVCDP, 2022). To address these challenges, one of the identified key strategies is to improve food safety and product quality standards (DA-HVCDP, 2022). The Technical Services Division (TSD) and Standards Development Division (SDD) of the DA-Bureau of Agriculture and Fisheries Standards (BAFS) found that some provisions in the Philippine National Standards (PNS) on Mangoes-Specifications (PNS/BAFS 13:2004) were outdated and not harmonized with international standards. These provisions were on the following: minimum quality requirements, classification, and size classifications. Likewise, information on maturity and defects as indicated in the Annexes of the PNS were observed to be outdated. Therefore, the amendment of PNS/BAFS 13:2004 is necessary to adapt to the current needs of the mango industry and improve the competitiveness of Philippine mangoes in the global market. The main objective of the study is to provide technical information on the present postharvest operations (i.e., sorting, grading, and packaging) of the mango



growers, maturity indices, and defects, that may serve as bases for the amendment of the current PNS.

Primary and secondary data gathering was conducted. Primary data on the current postharvest operations (sorting, grading, and packaging) of mango growers and defects were collected through one-on-one key informant interviews guided by a questionnaire. A total of 16 respondents were interviewed from Pangasinan and Batangas as top producers of Carabao and Pico mango varieties, respectively. They were identified based on the information from provincial and municipal Local Government Units (LGU). Secondary data on maturity indices were collected from information, education, and communication (IEC) materials of relevant agencies such as the DA-Agricultural Training Institute (ATI), University of the Philippines Los Banos -Postharvest Horticulture Training and Research Center (UPLB-PHTRC), and DA-Bureau of Plant Industry (BPI).

The major findings of this study were the following:

1. The minimum quality requirements considered by the respondents for both Carabao and Pico mangoes were: whole, firm, free of pest damage, disease, uncharacteristic taste, fresh in appearance, clean, free of bruising, uncharacteristic smell, maturity, and presence of peduncle. The average peduncle length was 1.06 cm.
2. Four classes were used to classify Carabao mangoes: Class A or 1, Class B or 2, Class C or 3, and reject. On the other hand, Pico mangoes were classified into five classes namely Class A/Primera/Good; Class B/Segunda/Dos/Semi; Trecera/Tres; Kabayo/Sapadera/Palay/Batibot; and Reject/Gulgol.
3. The weight limits per size classification for Carabao mango varied, but the weight limits used by the exporter respondents were almost identical to the weight limits prescribed by the Department of Agriculture - Bureau of Plant Industry (DA-BPI). They are as follows: Extra-large (>350), Large (300-349), Medium (250-299), and Small (200-249). For Pico mango, only the weight limits of 200-250 grams for the "large" size classification were common to the majority of the respondents. The size limits prescribed by DA-BPI were not applicable to Pico mangoes.

4. Different weight capacities of containers were used for Carabao and Pico mangoes. The packaging practices of Carabao mango growers also varied across all respondents. For Pico, a common packaging practice is to pack 4-5 pieces of fruit in a one-kilogram container
5. The maturity indices for Carabao and pico mangoes were the following: number of days from flower induction, flattening of fruit shoulders, fullness of cheeks, presence of bloom deposit, yellow-green color near pedicel, yellowing of pulp, sinking in salt solution, and total soluble solids (TSS).
6. The most common defect in mango was insect damage caused by fruit fly and cecid fly. Other observed defects included misshapen/deformed fruit, scratch/abrasion, leafhopper damage, scab, latex burn, latex stain, anthracnose, sooty mold, seed borer, bruises, stem end rot, crack, shriveling, and wind scar.

The major recommendations of the study are as follows:

1. Consider the following minimum quality requirements for mangoes: whole, firm, free of pest damage, disease, uncharacteristic taste, fresh in appearance, clean, free of bruising, uncharacteristic smell, maturity, and presence of peduncle.
2. For the Carabao mango variety, the weight limits used by exporters may be considered. These weight limits are as follows: Extra-large (>350), Large (300-349), Medium (250-299), and Small (200-249).
3. For Pico varieties, the weight limit of 200-250 g for the large size may be considered. The weight limits for the remaining size codes (i.e., dos, tres, sapadera) may be determined in consultation with stakeholders due to the lack of uniformity of the collected responses. The prescribed weight limits of DA-BPI for each size code were not applicable to Pico varieties.
4. Adopt the maturity indices recommended by relevant sources such as the DA-BPI, UPLB-PHTRC, and DA-ATI. These are the following: number of days from flower induction, flattening of fruit shoulders, the fullness of cheeks, presence of bloom deposit, yellow green color near pedicel, yellowing of pulp, sinking in salt solution, and TSS.