BUREAU OF AGRICULTURE AND FISHERIES STANDARDS
TECHNICAL BULLETIN
Number: TB-2024-26-C Date issued: 10/01/25

# Comparative Evaluation of Pummelo Grading and Classification Systems in Davao City Against Codex and ASEAN Standards

*Vivian E. Timple, Jerilee M. Sabariaga, Edna Lynn C. Floresca, and Karen Kristine A. Roscom, PFT, PhD*

This Technical Bulletin provides an overview of the comparative evaluation of Pummelo Grading and Classification Systems in Davao City to gather information on the current practices of pummelo growers and traders.

The information gathered shall serve as basis for the amendment of the PNS to align and harmonize with ASEAN Standard and Codex Standard for Pummelo. Harmonization or alignment of national standards against international and regional standards is a prerequisite to facilitate market access to agricultural commodities.

Considering the number of samples for this study, these findings are exploratory and site-specific, and should be interpreted as indicative rather than nationally representative.

## BACKGROUND

The Pummelo known as “suha” or “lukban”, is a high-demand fruit rich in antioxidant flavonoids and essential nutrients, including vitamins C, A, B1, B2, B6, and B12, as well as protein, calcium, potassium, iron, fiber, and folate. Its strong demand in both domestic and export markets is largely due to its health benefits and its application across various industries.

The widespread popularity and love for Pummelo across various cities and provinces is reflected in its high production volume. In 2022 alone, Davao City recorded the highest pummelo production in the country, with 12,987.97 metric tons (Philippine Statistics Authority [PSA], 2022). However, pummelo production faces several challenges, including nutritional disorders and inconsistent fruit quality (Fernandez & De Guzman, 2012). Additional industry concerns include low profitability, land-use conversion, inadequate institutional support, poor adherence to good agricultural practices, ineffective pest management, insufficient post-harvest facilities, and improper handling of the harvest product (Cosrojas et al).

In Davao, physical defects in pummelo fruits are a prevalent issue, significantly increasing production costs for many growers (Sunnexdesk, 2017).

A few of these challenges and limitations were addressed during the development of the Philippine National Standards (PNS) for Fresh Fruit - Pummelo (PNS/BAFPS 11:2004) in 2004. This standard establishes a system of grading and classification for commercially grown pummelo produced in the Philippines. The classification is based on the fruit’s physical characteristics as well as the established production and trading practices, as defined under Order No. 411, series of 2001.

However, lapses in the first draft of the Philippine National Standards (PNS) for Fresh Fruit - Pummelo have become evident, as several challenges and limitations have grown more pronounced over the years with the increasing demand for the fruit.

Subsequently, in 2022, the DA-BAFS Standards Development Division (SDD) conducted a harmonization assessment, which revealed that PNS 11:2004 was not aligned with the Codex Standard for Pummelo (CXS 214-1999), with a harmonization rate of only 19%.

Similarly, the PNS was not harmonized with the ASEAN Standard for Pummelo (ASEAN Stan 5:2007), also showing a 19% harmonization rate only. This underscores the importance of harmonizing national standards with international and regional standards to ensure market access for agricultural commodities. The Philippine standard for pummelo shows limited alignment with Codex and ASEAN Standards, potentially constraining its competitiveness in broader markets. This highlights the need to review and assess the existing grading and classification system for the Pummelo.

Therefore, the study was conducted to evaluate the current grading and classification systems for the ‘Magallanes’ pummelo variety in Davao City, comparing them to the relevant provisions in CXS 214-1999 and ASEAN Stan 5:2007. The study covered the ‘Magallanes’ pummelo, as it is the variety grown by the respondents and sold in the local market. The variety is considered one of the best varieties, originating in Davao City (Fernandez & De Guzman, 2013).

The findings of this study will contribute to the possible amendment of the PNS/BAFPS 11:2004, with the goal and consideration to harmonize it with both Codex and ASEAN Standards. The results may also be used in the development of knowledge products.

***The Philippine standard for pummelo shows a low level of alignment with international and regional standards, which may constrain its competitiveness in broader markets and highlights the need to assess the current grading system for the ‘Magallanes’ variety in Davao City.***

## KEY FINDINGS

The study generated significant insights from data collected through face-to-face interviews with key informants, guided by a structured questionnaire. The important insights yielded two distinct sets of information. The primary data reflect formal requirements, including maturity and classification, sizing, quality allowances, packaging, and labelling. Another set of data consisted of the growers' practices related to trading, illustrating how these requirements are applied in practice, covering size classification (based on weight measurements of random samples), packaging, and product marking or labeling. These insights provide a foundation for future pummelo studies and directly inform the study's recommendations

### Alignment of the local pummelo growers' grading and classification system

### A. Minimum Requirements

Both Codex Standard for Pummelo (CXS 214-1999) and ASEAN Standard for Pummelo (ASEAN Stan 5:2007) prescribe 11 minimum requirements. The practices of local respondents were aligned with nine of these requirements, which largely focus on the physical appearance of the fruit. These include the fruit being whole, sound, clean, free from pests and pest damage, free of abnormal external moisture, free of foreign smell or taste, free of bruising, and exhibiting appropriate development and ripeness typical of the variety or commercial type. However, compliance was lacking in terms of firmness and freedom from damage caused by low temperatures. This indicates that while most physical appearance requirements are met, gaps remain in post-harvest handling aspects, such as firmness and damage due to low temperatures.

### B. Maturity Requirements

Both standards identify Total Soluble Solids (TSS) as a parameter indicator. The minimum TSS value adopted by one respondent (33%) was 9%, which is slightly higher than the prescribed minimum of 8% under Codex and ASEAN standards. For coloring, both standards require that the color change should cover at least two-thirds of the fruit surface. None of the respondents, however, specified the extent of surface color change in their practices. It was also noted that all respondents also considered days after antithesis or flowering, which was not prescribed in any of the international standards.

These findings suggest general alignment with TSS requirements, but a lack of clear parameters in the aspect of color change.

### C. Classification of Pummelo

Both the Codex and the ASEAN Standard prescribe three classes: Extra Class, Class I, and Class II. Locally, these correspond to Class A, B, and C in terms of the degree of allowable defects. However, the type of defects recognized by the respondents deviated from both Codex and ASEAN Standards, which were as follows:

- Extra Class - the criterion that the fruits must be characteristic of the variety and/or commercial type was not practiced by respondents.
- Class I - Only one respondent (33%) concurred in the absence of insect damage, with affected areas limited to 10%.
- Class II - Only one respondent (33%) aligned with standards on defects in shape, and another (33%) aligned with the absence of insect damage as a parameter. Furthermore, one respondent allowed defects covering 30% of the fruit surface, which exceeds the Codex and ASEAN limit of 15%.

This reflects partial but inconsistent alignment with international classification standards, particularly in the definition and tolerance of defects.

**D. Size Classification and Quality Tolerances**

In terms of size classification, both the Codex and ASEAN standards define pummelo sizes based on weight and/or equatorial diameter. Local practice, however, was based solely on weight. While respondents used different-sized code names than the standards, the weight ranges they applied were within sizes 3 to 7 of the Codex and sizes 4 to 9 of the ASEAN standard.

For quality tolerances, both Codex and ASEAN Standard prescribed quality tolerances (by number or weight) of 5% for Extra Class, 10% for Class I, and 10% for Class II. Respondents, however, reported no tolerance levels. Instead, they indicated that fruits of the same class are strictly packed together in one container.

This shows that while local sizing generally falls within prescribed weight ranges, the absence of tolerance provisions sets local practice apart from international standards

**E. Packaging Requirements**

Locally, two types of packaging are used: retail and bulk packaging. Both were found to comply with the recommended materials under the Codex Standard. Respondents also adhered to standards requiring the use of paper or stamps with non-toxic ink or glue, as well as food-grade stickers on each fruit for both retail and bulk packaging.

However, overfilling of plastic woven bags was observed, despite the recommendation of the Codex Standard to ensure proper filling of containers, particularly in plastic woven bags.

This further reveals lapses in handling practices that may affect product quality despite general compliance with packaging material requirements.

***Local pummelo practices demonstrate substantial alignment with Codex and ASEAN standards; however, critical gaps persist in certain areas, further emphasizing the need to accommodate and comply with international standards.***

**F. Labeling Requirements**

Both Codex Standard and ASEAN Standard prescribe labeling requirements for consumer packages and non-retail containers, in addition to the Codex General Standard for the Labelling of Pre-packaged Foods (CODEX STAN 1-1985, Rev. 2-1999).

For consumer packages, respondents followed the prescribed standards, including labeling the name of the produce when it is not visible from the outside, which suggests compliance with CODEX STAN 1-1985, Rev. 2-1999 was observed, except for requirements on lot identification and storage instructions.

For non-retail containers, both Codex and ASEAN require the following information:

- Identification (name and address of exporter, packer, or dispatcher)
- Nature of produce (name of produce and/or variety or commercial type)
- origin of the produce (country of origin or national/regional/local place name)
- commercial identification (class, size, net weight, and number of fruit)
- official inspection mark

Among these requirements, only one respondent (33%) partially complied with these requirements by providing the size of the fruits contained inside the plastic woven bags, showing gaps remain in most of the labeling requirements.

Partial compliance with some of the requirements demonstrates local pummelo practices' substantial alignment with Codex and ASEAN standards; however, critical gaps persist in certain areas, further emphasizing the need to accommodate and comply with international standards.

A summary of the comparison between local grading and classification practices and the standards set by Codex (CXS 214-1999) and ASEAN (ASEAN Stan 5:2007) is presented in Table 1.

| Grading and Classification System Requirements | Codex Standard for Pummelo (CXS 214-1999) | Asean Standard for Pummelo ( ASEAN Stan 5:2007) | Local Practices and PNS for Fresh Fruit - Pummelo |
|---|---|---|---|
| **a. Minimum Requirements** | 11 requirements, mainly on the physical appearance of the fruit. | 11 requirements, mainly on the physical appearance of the fruit. | Compliance with 9 out of the 11 requirements were observed. |
| **b. Maturity Requirements** | 8% of Total Soluble Solids (TSS) | 8% of Total Soluble Solids (TSS) | One respondent adopted the slightly higher TSS Value (9%). |
| **c. Classification of Pummelo** | Three Classifications:<br>1. Extra Class<br>2. Class I<br>3. Class II | Three Classifications:<br>1. Extra Class<br>2. Class I<br>3. Class II | Three Classifications:<br>1. Class A<br>2. Class B<br>3. Class C |
| **d. Size Classification** | Weight and/or equitorial diameter | Weight and/or equitorial diameter | Sizes based on weight (weight ranges within. the sizes 3-7 of the Codex and sizes 4-9 of the ASEAN Standard) |
| **e. Quality Tolerances** | Quality Tolerances (by number or weight):<br>1. Extra Class - 5%<br>2. Class I - 10%<br>3. Class II - 10% | Quality Tolerances (by number or weight):<br>1. Extra Class - 5%<br>2. Class I - 10%<br>3. Class II - 10% | No tolerance levels |
| **f. Packaging Requirements** | Retail and Bulk Packaging, use of paper or stamps with non-toxic ink/glue, food-grade stickers | Retail and Bulk Packaging, use of paper or stamps with non-toxic ink/glue, food-grade stickers | Overfilling of plastic woven bags was observed |
| **g. Labeling Requirements** | For consumer packages: Label on the packaging, lot identification and storage instructions<br><br>For non-retail containers: Identification, Nature of Produce, origin, commercial identification, official inspection mark | For consumer packages: Label on the packaging, lot identification and storage instructions<br><br>For non-retail containers: Identification, Nature of Produce, origin, commercial identification, official inspection mark | Labelling practices are generally consistent with both standards, though certain elements such as lot identification and storage instructions were not covered. |

*Table 1. Comparison of local grading and classification system against Codex and ASEAN Standard*

As shown, local practices generally meet most physical and maturity requirements, though inconsistencies remain in tolerance levels, labeling details, and packaging practices. The findings show that while local practices generally align with key parameters, several gaps remain. Notable deviations are evident in some of the practices. Overall, the table highlights substantial conformity to international standards, but also emphasizes areas needing compliance with Codex and ASEAN Standards.

**Validation of Growers' and Traders' Practices against Codex and ASEAN Standards**

**A. Size Classification for traders and growers**

For both growers and traders, size classification was based on weight, with exceptions to size codes that were used by the traders. The most common size codes observed were: Peewee, Small, and OS. The weight intervals observed at the market fell within the range prescribed by the growers for each size code.

Compared to the standards, the weight ranges of the fruits at the market were within sizes 2-7 of the Codex and sizes 3-9 of the ASEAN Standard. Similar to this are the measured equatorial diameter for each size code, overall indicating that local size classifications generally align with Codex and ASEAN Standards.

**B. Packaging and Marking or Labelling**

Locally, the same packaging requirements of the growers were observed in the market. For instance, the packaged fruits and corrugated boxes were utilized by the grower respondents, intended for retail packaging. In contrast, for unpackaged fruits sold separately, the usage of paper or stamps with trade specifications was observed in the local markets. Labelling requirements were likewise practiced by growers.

This indicates that local market practices in packaging and labeling are largely consistent with growers' methods, showing general alignment with recommended standards.

The comparison of growers' and traders' practices against Codex and ASEAN (ASEAN Stan 5:2007) Standards is summarized in Table 2.

| Parameter | Codex and ASEAN Standards | Observed Local Practices (Growers & Traders) | Alignment/Observation |
|---|---|---|---|
| **Size Classification** | Codex (CXS 214-1999): Sizes 0–7<br>ASEAN Stan 5:2007: Sizes 1–9 (based on weight and/or equatorial diameter) | Both growers and traders use weight-based classification only. Common size codes: Peewee, Small, Large and Oversized Fruits (OS). | Local classifications generally align with both standards despite having none of the size codes and their corresponding weight intervals exactly aligned. Local weight ranges fall within Codex (2–7) and ASEAN (3–9) sizes. |
| **Packaging Requirements** | Codex and ASEAN Standard recommends proper packaging materials (e.g., corrugated boxes) and practices. | Corrugated boxes used for retail packaging and paper/stamps with trade specifications for unpackaged and individually sold fruits. | Local packaging practices align with Codex and ASEAN recommendations. |
| **Marking/Labelling** | Codex Standard and ASEAN Standard require labeling with product name and trade identification. | Growers and traders use labels or stamps with trade names/specifications. | Labelling practices are consistent with both standards. |

*Table 2. Comparison of local Growers' and Traders' practices against Codex and ASEAN Standard*

This table illustrates the level of alignment between local pummelo growers' and traders' practices and the prescribed Codex and ASEAN standards. Results indicate high conformity in packaging, followed by size classification and labeling, reflecting general compliance but also highlighting areas where it can be further strengthened.

## RECOMMENDATIONS/CONCLUSION

Based on the findings, it is recommended that local standards align more closely with Codex and ASEAN provisions to further strengthen the alignment of local practices with Codex and ASEAN Standards. The following measures are recommended:

For minimum requirements, the standards prescribed by prescribed by both CXS 214-1999 and ASEAN Stan 5:2007 may be adopted which ensure that the fruits are whole, sound, clean, free of pests and pest damage, free of abnormal external moisture, free of foreign smell and/or taste, firm, free of damage caused by low temperatures, free of bruising, and at an appropriate degree of maturity and ripeness.

For maturity requirements, a minimum value of 8% Total Soluble Solids (TSS) should be adopted. In terms of coloring, the local production guide of 50% surface color may be considered in place of the 67% under Codex and ASEAN Standards.

For classification, the Codex and ASEAN categories (Extra Class, Class I, and Class II) and their corresponding criteria should be adopted. A summary table containing the characteristics of local pummelo varieties or cultivars, along with common defects, is recommended to guide compliance with the requirement that Extra Class fruits must be characteristic of the variety and/or commercial type. With respect to size codes, the ASEAN Stan 5:2007 codes for the 'Magallanes' variety may be adopted, with reference to the corresponding Codex size codes. Similarly, the quality tolerances prescribed in Codex and ASEAN standards should be observed, namely 5% for Extra Class, 10% for Class I, and 10% for Class II.

For the packaging requirements, it is recommended to adopt the prescribed provisions regarding appropriate packaging methods and materials, while also incorporating compliance with the Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CXC 44-1995) and the Code of Practice (COP) for Packaging and Transport of Fresh Fruits and Vegetables (PNS/BAFS 198:2017).

Finally, for the labelling requirements, both consumer packages and non-retail containers should follow the provisions of CXS 214-1999 and ASEAN Stan 5:2007. Consumer packages must bear the name of the produce, in addition to the requirements under the General Standard for the Labelling of Prepackaged Foods (CXS 1-1985), while non-retail containers should include identification, nature of produce, origin of produce, and commercial identification.

Overall, local pummelo practices demonstrate substantial alignment with Codex and ASEAN standards, yet critical gaps persist in areas such as classification, quality tolerances, and labeling. Bridging these gaps will strengthen compliance with international requirements and enhance product quality, competitiveness, and market access for Filipino farmers.

**Authors:** Vivian E. Timple, Jerilee M. Sabariaga, Edna Lynn C. Floresca, and Karen Kristine A. Roscom, PFT, PhD
**Technical Content and Layout:** Daniela Pearl G. Pascua
**Editors:** Katrina M. Maniling and Mary Grace R. Mandigma, PFT

**Download the full-text of this paper by scanning the QR code or by visiting bit.ly/TBPummelo**