



# **Classification criteria for *Cavendish* bananas and a framework to indicate the correct destination**

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**Abstract:** The quality classification criteria are one way to evaluate the food supply chain, notwithstanding that Brazil is not mandatory. Thus, this paper aims to investigate the banana quality classification criteria used by wholesalers in the Alto Tietê Region, Brazil, by collecting and analyzing a total of 239 bananas from 12 leading wholesalers. The results showed that the retail offers medium and large sizes of bananas (classes 15, 18, and 22), categorized as Extra (caliber bigger than 32 mm), and degree of maturity between subclasses 6 and 7. In addition, we are considering the framework to correct destination 38% to fresh sales in market and the 62% for the industry.

**Keywords:** Food supply chain; Perishability monitoring; Quality control.

# Materials and Methods

12 retails covering the following cities

- Biritiba Mirim;
- Guarulhos;
- Itaquaquecetuba;
- Mogi das Cruzes;
- Poá;
- Suzano.

For sample composition

- 20 banana fingers;
- per homogeneous batch of each establishment;
- 240 fingers in total.

Materials

- Hygiene items,
- Measuring tape;
- Precision scale;
- Checklist

## Results and Discussion

The average price of the finger of banana in the region was  $0.53 \pm 0.21$ . The price showed a high variation among supermarkets in the Alto Tietê region (~40%), as well as the net weight (~30.5%), with banana fingers being found for R\$ 0.16 to R\$ 1.36 and net weight from 53 to 214 grams.

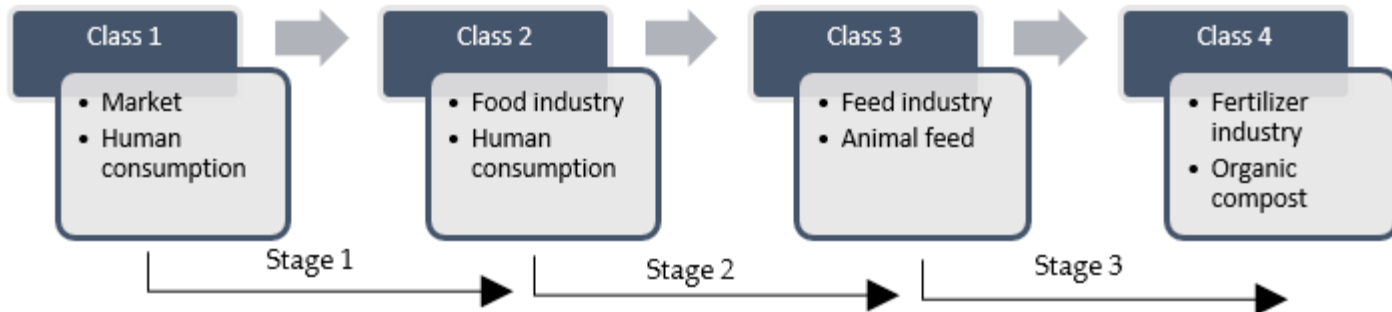
**Table 1.** Statistical comparison of quality criteria among banana fingers classes.

Quality Criteria	Class 15 (n = 35)	Class 18 (n = 129)	Class 22 (n = 75)
PR	$0.39 \pm 0.14^a$	$0.54 \pm 0.19^b$	$0.60 \pm 0.25^b$
GW	$108.85 \pm 12.69^a$	$146.86 \pm 25.23^b$	$195.29 \pm 33.36^c$
PW	$44.25 \pm 8.84^a$	$56.14 \pm 9.96^b$	$67.34 \pm 10.63^c$
NW	$64.57 \pm 9.17^a$	$90.71 \pm 20.01^b$	$127.94 \pm 27.40^c$
EL	$17.31 \pm 0.72^a$	$20.60 \pm 1.13^b$	$23.78 \pm 0.92^c$
EC	$33.95 \pm 1.95^a$	$36.83 \pm 2.90^b$	$38.94 \pm 2.45^c$

<sup>a,b,c</sup> similar letters are not statistically significant by the Dunn test ( $p < 0.05$ ).

# Results and Discussion

Currently, market practice has used the manual classification process to separate products with marketing standards from those that do not. This results in many products being rejected for commercialization and not being sent to the market increasing the rate of food losses.



**Figure 1.** Conceptual framework to the banana correct destination.

# Conclusions

The banana classification process permeates the production chain and requires a new behavior from everyone involved.

However, it was evident that carrying out the classification only in the transference of the fruit between supplier and buyer is not enough. It is necessary to monitor the food during the exhibition at retail/wholesale stands, ensure food safety, and reduce food waste with the correct fruit destination.



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# Acknowledgments

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