The Sensory Characteristics of Commercially Available Bananas in Thailand

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Introduction

The banana (*Musa acuminate)* is the most commonly consumed tropical fruit and although many varieties exist, the Cavendish banana is the only major cultivar, accounting for most of the world's exports. However, because the Cavendish banana is so ubiquitous and asexual clones are used to reproduce, there is little genetic diversity. A major disease epidemic could destroy the variety. The "Gros Michel" has already suffered Panama Disease. Many varieties are grown in Asia and could be used to introduce some diversity in the world banana market. A major issue is that the sensory characteristics would have to be similar to that of Cavendish banana in order to accepted in many markets. The objective of this study was to compare sensory descriptive profiles of major banana varieties in Thailand to determine how they compare to each other and to the Cavendish cultivar grown in two South American countries and the finger banana also available in the U.S.

Materials and Methods

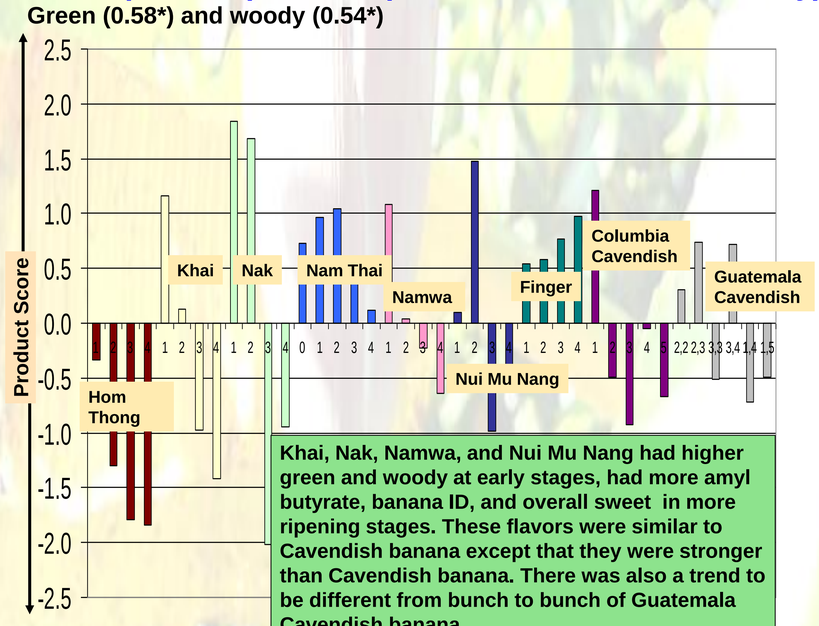
- A total of 8 banana varietals were collected and evaluated in Thailand and in the U.S.
- Samples evaluated in Thailand: Nak, Hom Thong, Nui Mu nang, Khai, Nam Thai, Namwa.
- Samples evaluated in the U.S.: Cavendish (originated in Columbia and Guatemala) and Finger (originated in Mexico).
- Four professional panelist members of the Sensory Analysis Center, Kansas State University, Manhattan, KS, USA, participated in this study.
- Testing sessions were conducted in the Department of Food Technology, Chulalongkorn University, Bangkok, Thailand, and the Sensory Analysis Center, Kansas State Univ., USA
- Bananas of various stages of ripeness were available. Bananas were evaluated over 4 or 5 ripeness stages, depending on availability.
- Bananas of each variety were peeled and cut into half-inch-thick pieces. Panelists were randomly served at least 6 pieces per sample; each person had least one piece from each banana. Samples were served on a Styrofoam plate and were labeled with 3-digit code numbers.
- A completely randomized design was used and a numerical scale of 0-15 with 0.5-point increments was used for this study. Panelists produced a consensus profile for each sample and were allowed to add more terms to the lexicon if a new flavor was found that had not been present in the orientation samples.

Results

Means for each variety and ripening stage of the bananas were analyzed with principal component analysis (Varimax rotation) and cluster analysis. The first 4 principal components explained 61.67% of the total variability.

Principal Component 1 (18.51% of the total variability)

Green (0.58*) and woody (0.54*)



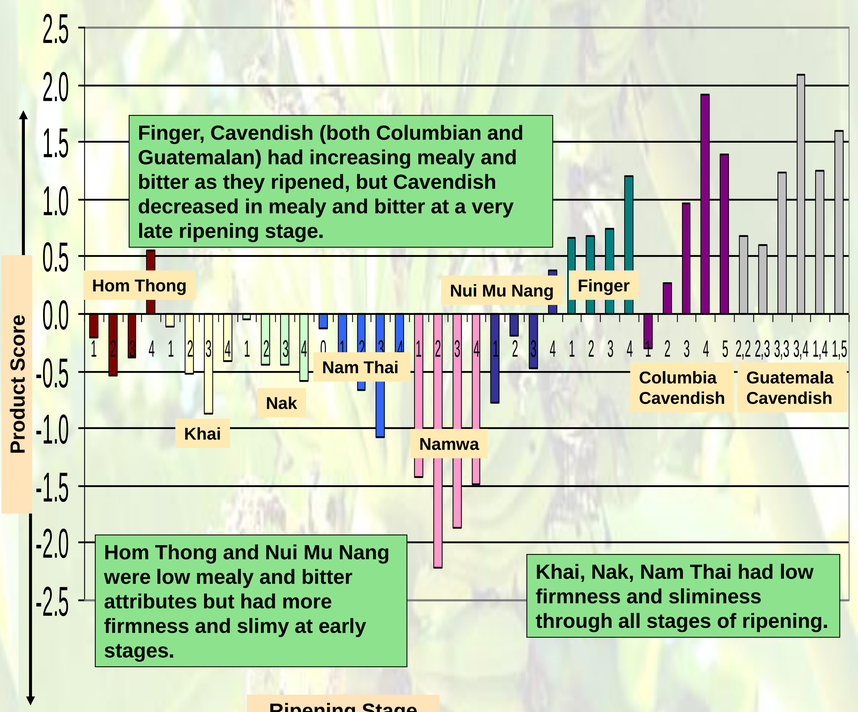
Amyl butyrate (-0.71*), banana ID (-0.75*), and overall sweet (-0.83*)

Ripening Stage

Note: The numbers on x-axis are "ripening stage" or "bunch and ripening stage."
*The number in a parenthesis corresponds to factor loading.

Principal Component 2 (18.17% of the total variability)

Mealy (0.85*) and bitter 0.68*)



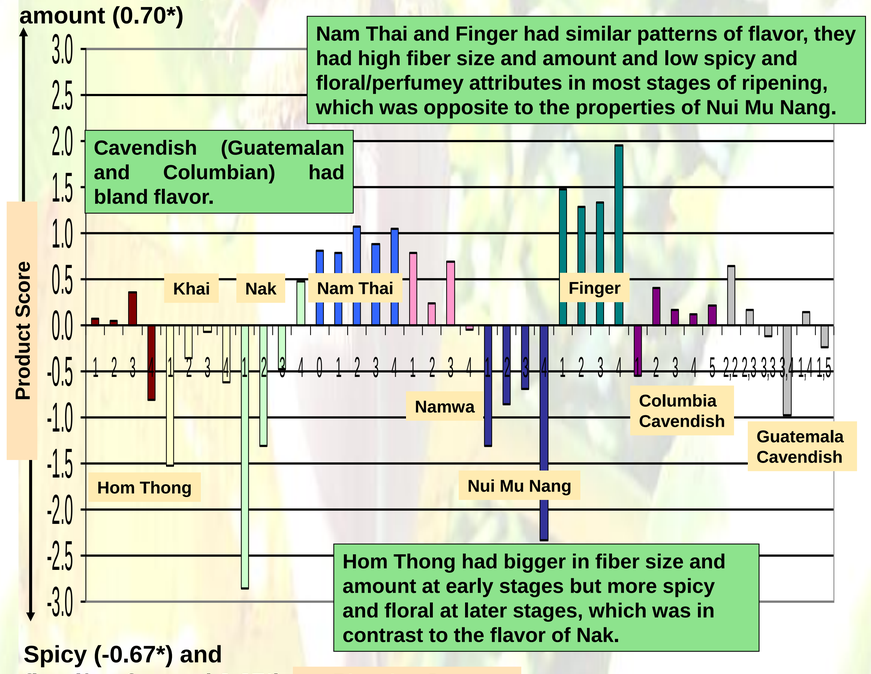
Firmness (-0.78*) and slimy (-0.84*)

Ripening Stage

Note: The numbers on x-axis are "ripening stage" or "bunch and ripening stage."
*The number in a parenthesis corresponds to factor loading.

Principal Component 3 (13.51% of the total variability)

Fiber size (0.71*) and amount (0.70*)



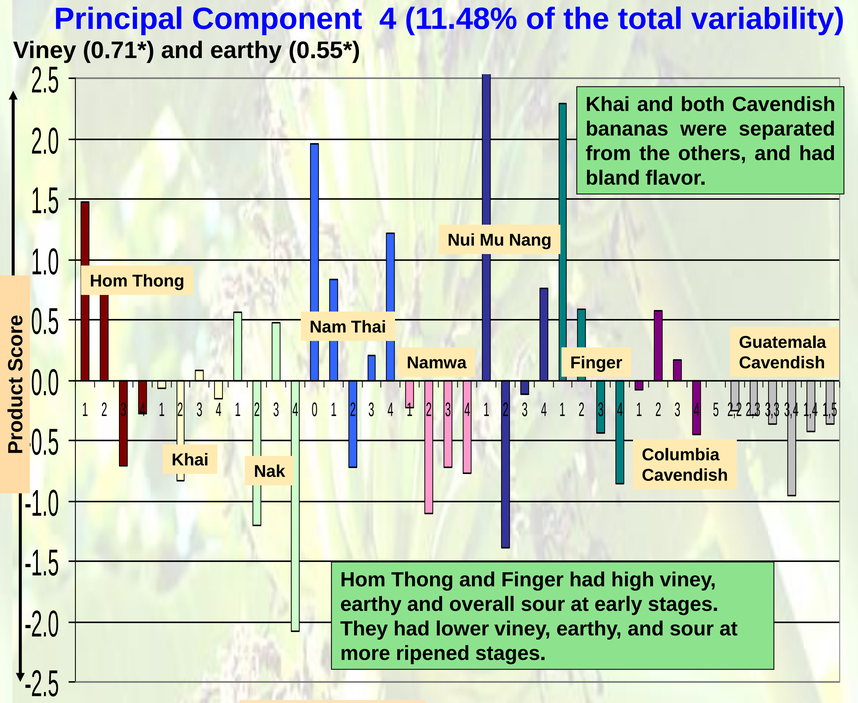
Spicy (-0.67*) and floral/perfumey (-0.67*)

Ripening Stage

Note: The numbers on x-axis are "ripening stage" or "bunch and ripening stage."
*The number in a parenthesis corresponds to factor loading.

Principal Component 4 (11.48% of the total variability)

Viney (0.71*) and earthy (0.55*)

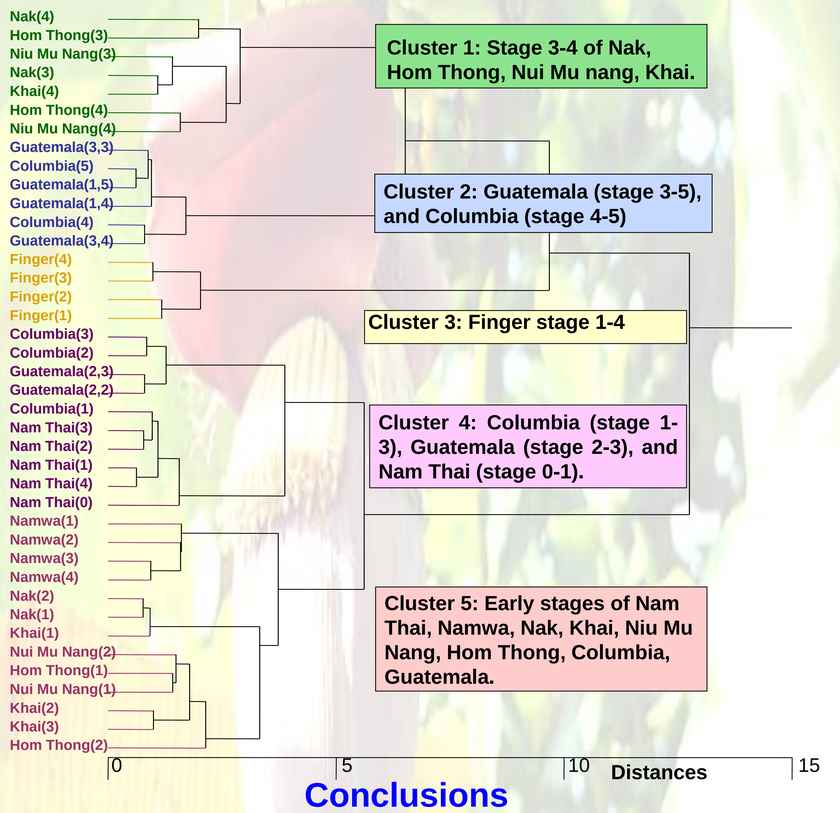


Overall sour (-0.50*)

Ripening Stage

Note: The numbers on x-axis are "ripening stage" or "bunch and ripening stage."
*The number in a parenthesis corresponds to factor loading.

Cluster Tree



Conclusions

- Some banana varieties, such as Nam Thai (and Namwa) had sensory profiles similar to the early stage of Cavendish bananas except that they had a stronger flavor. Hom Thong, Nak, and Nui Mu Nang at late ripening stages had similar sensory flavor profiles to the late stage of Cavendish banana.
- Even though profiles were similar, Principal Component 2 showed that bananas differ on some aspects which might impact consumer acceptance.
- The Thai banana varieties had different sensory profiles than ones on the U.S. market. These might be appreciated by consumers for their different characteristic sensory properties, but probably cannot replace the Cavendish banana directly. These alternative varieties might generate consumer interest in markets where people are looking for greater flavor diversity. In addition, it may be possible to breed characteristics of the alternative varieties with those of Cavendish for more genetic diversity while maintaining sensory properties similar to Cavendish.