Consumer Acceptability of Fresh Mangos Harvested at Two Maturities

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Executive Summary
Four varieties of mangos were harvested at 2 maturities (grade 1 and grade 2), allowed to ripen to maturity stage 4-5, and then subjected to consumer acceptability sensory testing. There were no consistent trends between the 2 harvest maturities, and the results differed among varieties. There was no significant effect of harvest maturity on the overall acceptability and preference for Honey and Tommy Atkins mangos. However, grade 2 Kent mangos had higher acceptability and preference compared to grade 1. The results were opposite for Keitt, the grade 2 had higher overall acceptability and preference compared to grade 1.

Introduction
Mangos are typically harvested commercially at what is referred to "Grade 1" or maturity level 2.5. However, allowing the mangos to ripen slightly further before harvest ("Grade 2" or maturity level 3.5) may improve the quality once the mangos reach the normal optimum eating maturity stage of 4-5. Greater maturity at harvest may allow for more development of desirable sensory characteristics and flavor volatiles. In addition, the optimum maturity at harvest may be variety specific.

The objective of this project was to compare the consumer acceptability of four common mango varieties harvested at 2 maturities (Grade 1 and Grade 2). It is hypothesized that harvesting mangos at a slightly greater maturity could increase consumer acceptability after full ripening.

Materials and Methods
The National Mango Board arranged for the 4 varieties of mangos (Honey, Tommy Atkins, Kent, Keitt) to be harvested at both grade 1 and grade 2. Mangos from both harvest maturities for a variety were then shipped to the University of Florida. Mangos were held at room temperature for further ripening to maturity stage 4-5 before sensory evaluation. The Honey mangos were shipped in June 2021, Tommy Atkins and Kent were shipped in July 2021, and the Keitt in September 2021.

For sensory testing, approximately 70 panelists were recruited via email from a large list of people what had participated in previous sensory tests. Only panelists who indicated they consumed fresh mangos were chosen. For sample preparation, several mangos from each maturity were peeled and chopped into small chunks by hand and combined into a composite sample from multiple mangos. Approximately 4 chunks from each sample were placed into small plastic cups labeled with 3-digit random numbers. The order of presentation of the 2 harvest maturities were alternated between panelists. Panelists evaluated the 2 samples of mango pieces in private booths in the Sensory Lab in the Food Science and Human Nutrition Department. The 2 samples were placed on a tray in the proper order and given to the panelists for evaluation. Panelists were supplied with water and unsalted crackers to cleanse their mouth between samples, and a plastic fork to taste the samples. The questionnaire was administered via computers in each booth using the software Compusense, and all data was collected with Compusense.

Panelists entered their gender, age, ethnicity, household income, education level, and mango consumption frequency before evaluating the samples. Panelists were then instructed to first rate how much they liked the appearance and color of a sample on the 9-point hedonic scale with ranged from 1=dislike extremely to 5=neither like nor dislike, to 9=like extremely. Panelists were also asked to rate the color of the sample on a 5-point Just About Right (JAR) scale, where 1=much too pale, 3=just about right, 5=much too dark. Panelists were then instructed to taste the sample and rate the overall liking, flavor liking and texture liking on the 9-point hedonic scale. They were also instructed to rate the sweetness, sourness, mango flavor, and texture on the 5-point JAR scale. For sweetness, sourness and mango flavor, 1=not at all sweet, sour or enough mango flavor, 3=just about right, and 5=much too sweet, sour or mango flavor. For texture JAR, 1=much too soft, 3=just about right, and 5=much too firm. Panelists were also instructed to rate the level of fibrousness on a 0-100 line scale with 1=no fiber (not fibrous) and 100= high fiber (very fibrous). After the panelists had rated all the attributes for each sample, they were then asked to indicate which samples they preferred.

For data analysis, all rating data (hedonic, JAR, fibrousness) were analyzed by a 2-way analysis of variance followed by mean separation using Fisher's LSD if the sample effect was significant ($p<0.05$). Data are presented in bar graphs with the means and mean separation letters. For the preference choice, a standard table with critical number of correct responses in a two-sided directional difference test was consulted to determine if there was a significant difference in preference ($p<0.05$). Preference data is also shown in a bar graph with the number preferring each sample given with letters used to indicate statistical significance.

Results and Discussion

The demographic data varied slightly for each panel. In general, there were ca. 60% female and 40% male in each panel. The ethnicity was 40-50% White, 12-15% Hispanic, 9-10% Black, and 27-34% Asian. Greater than 50% of the panelists reported incomes greater than $50,000 (annual), and the education level was over 80% with a college degree (or higher). For mango consumption, over 80% of the panelists reported that they consumed mangos every 2-3 months or more frequently.

For the Honey mangos, there were no significant differences between the 2 harvest maturities in any of the sensory attributes except sourness (Figures 1-12). Honey mangos harvested at grade 2 were rated less sour, but it did not impact acceptability or preference. The results were similar for Tommy Atkins mangos, except the flavor liking was also lower in grade 2. However, the lower sourness and flavor liking in grade 2 Tommy Atkins did not impact overall acceptability or preference.

For the Kent mangos, grade 2 mangos were rated lower in overall acceptability, appearance and color acceptability, flavor acceptability and texture acceptability (Figures 1-12). The sweet, sour and mango flavor JAR's indicated that the grade 2 mangos were not quite sweet enough, not quite sour enough, and did not have enough mango flavor. The grade 1 mangos were also significantly preferred over the grade 2 Kent mangos.

For the Keitt mangos, grade 2 mangos were rated higher than grade 1 for overall acceptability and flavor acceptability, and were significantly preferred over grade 1 (Figures 1-12). The color and sweet JAR's indicated that the grade 1 mangos were a little too light in color and not quite sweet enough.