



Frozen Mango Assessment & Consumer Research

CONFIDENTIAL
Final Report
Prepared by Attribute Analytics for
National Mango Board
October 29, 2021
www.attributeanalytics.com





Project Background

National Mango Board's mission is to increase the consumption of mango in the U.S. by inspiring and educating consumers about the culture, flavor, and nutrition of mangos while bringing the industry together. NMB has a keen interest in understanding consumer perception and the attributes of frozen mango products.

Attribute Analytics' trained panel measures and defines flavors and textures with objective, sensory data. Revealing the "flavor DNA" of the products assists with the ability to communicate and provides a deep understanding and ownership around frozen mango products and the entire category.

As the food industry shifts towards technology and data driven-decisions, food quality traits are rapidly gaining importance. Creating a standard lexicon improves communication and efficiencies along the entire supply chain: farmers, producers, consumers, marketers, and researchers.

A universal language will emerge by correlating work from previous studies on varieties and texture: 2020 Consumer Acceptability of Frozen Mango from Different Varieties, University of Florida; 2015 Describing Quality and Sensory Attributes of Three Mango Cultivars at Three Ripeness Stages Based on Firmness, University of California at Davis.

The objective of this project was to analyze and write Descriptive Analysis Profiles on frozen varieties: Keitt, Tommy, Kent, and Edward and following, probe consumers about perceptions, usage and ideas around frozen mango chunks using a consumer focus group.

This project will fill knowledge gaps in frozen fruit research from both a sensory technical and consumer point of view while providing visualized tools that will help define industry standards.



Materials and Methods

The mango varieties tested were Keitt (conventional), Kent (conventional), Tommy Atkins (conventional) and Edward (conventional). Edward was sourced via retail source using BB Date and Country of Origin. Frozen mango pieces from other varieties were shipped as available, via Fed Ex. They were verified and sent by the Quality team at Patagonia Foods to Attribute Analytics for testing. The mango products were kept frozen.

Trained panel sensory testing

Attribute Analytics' internal sensory panel consists of highly trained panelists from the food and beverage industry. Each panelist has descriptive analysis training and experience in sensory testing of beverages and food products including mangos and other tropical fruits. For this project, the trained panelists received additional orientation and calibration by evaluating mango products including dried mango, mango juice, and fresh mango that were included in blind evaluations.

Frozen mango pieces were thawed via refrigeration prior to tasting and were room temperature at time of tasting. Panelists evaluated the frozen mango in the Attribute Analytics dedicated tasting room. Approximately 5-7 pieces of each mango sample were placed in 4 oz. white plastic cups and labeled with 3-digit random numbers. Samples were placed on a tray for panelists for evaluation. Whole mango pieces were tested individually as they arrived from origin and as a complete set. The mango was also evaluated pureed to ensure consistency and to verify and replicate descriptive data.

Descriptive analysis data is presented in Descriptive Analysis Profile, each variety was plotted on a graph and using attribute and intensity scales, displayed in a summary chart.

Consumer focus group

Consumer panelists were recruited via email from a list of participants from previous focus groups. 12 panelists were chosen for a range of ethnicity, and from those who indicated they consumed frozen or fresh mangos more than two times per month. Mango pieces were thawed via refrigeration prior to tasting and were room temperature at time of tasting. After an initial mango discussion, paper questionnaires were administered with de-thawed mangos on a divided plate. Panelists were queried about liking using hedonic scale (ranged from 1=dislike extremely to 5=neither like nor dislike, to 9=like extremely) and about purchase intent. After the panelists tasted and filled out questionnaires, the group was moderated for a guided discussion using a prewritten moderation guide. Research is summarized in highlighted topic sections.

Attribute Analytics - Descriptive Analysis

Descriptive Analysis is a way of gathering data. It's a valuable tool for providing information on appearance, aroma, flavor and texture of food and beverage products. It is one of the key instruments of Sensory Analysis; when used effectively it benefits product and process development, shelf-life studies, product improvement, quality assurance/control and marketing. These profiles provide a deep understanding and language for frozen mango and its attributes. Our understanding of frozen mango attributes correlated with consumer insights helps us understand how to deliver high quality product that answers a need for consumers.

Assessment Design and Methodology

- Mango Samples and Initial Assessment: Seasonal collection via retail and Patagonia Foods who sent verified cultivar type. Panel reorientation to mangos flavor and mango qualities.
- Blind Coded Assessment of four types frozen mango samples — Identified, described, and quantified mango sensory attributes using intensity scale.
- Mango Lexicon Terms: Developed, referenced, and refined throughout project process.
- Developed visualized profiles for each mango type. Data was analyzed and visualized based on Descriptive Analysis Profile for each variety and used as basis for additional charts.



Mango Lexicon Terms

| Attribute Term | Definition and Reference |
|----------------|---|
| Sweet | The basic taste of sweet. Sucrose in water is typical reference. |
| Mango | Mango-like is a sweet, tropical, perfumy flavor sometimes having pine and green notes. Fresh mango is typical reference. |
| Umami | The basic taste of savory or broth-like. MSG in water is typical reference. |
| Sour | The basic taste that makes the mouth pucker. Citric acid in water is typical reference. |
| Tropical Fruit | Aromatics and flavors associated with a blend of tropical fresh fruits like pineapple, papaya, citrus, and banana. |
| Metallic | The flavor notes associated with flavors from metals. |
| Green Fruit | The notes associated within immature, underdeveloped or underripe fruits. |
| Pine | The aroma and flavor associated with pine trees, needles and conifers. |
| Bitter | The lingering basic taste felt in the back of the mouth. Caffeine in water is typical reference. |
| Citrus | The aroma and flavor associated with fresh grapefruit, lemon, orange, limes and their natural oils. |
| Perfumy | The ambrosial, fresh blossom, and sweet perception of fragrant foods. Blueberries and many tropical fruits have perfume-like qualities. |

A mango lexicon including attributes and references was developed from our years of assessments of mango products as well as recent samples. Future use will continue to validate the use of this lexicon by evaluating samples that contain these or other unique features.

The lexicon used in this study is relevant for sensory panel use but also as a communication tool for producers in the mango industry at large or manufacturers who use mango as an ingredient. Mango descriptions can be made based on this terminology and these same terms can be used for consumer or customer education and in product development of mango flavored consumer products.

It may necessary to create appropriate sub-lexicons for specific objectives such as evaluation of a new origin, or specific to kinds of preparations; for example, a sub-lexicon for frozen, fresh or processed.

This lexicon should be considered a living document that can be added to or modified over time when needed allowing stake holders for expansion and ownership of this technical vocabulary.



Descriptive Analysis Profile

Product: Frozen Kent Mango Chunks

Supplier: Patagonia Foods

Lot Code:

Category: Frozen Fruit

Evaluation Date: July 15 - Sept. 15 2021

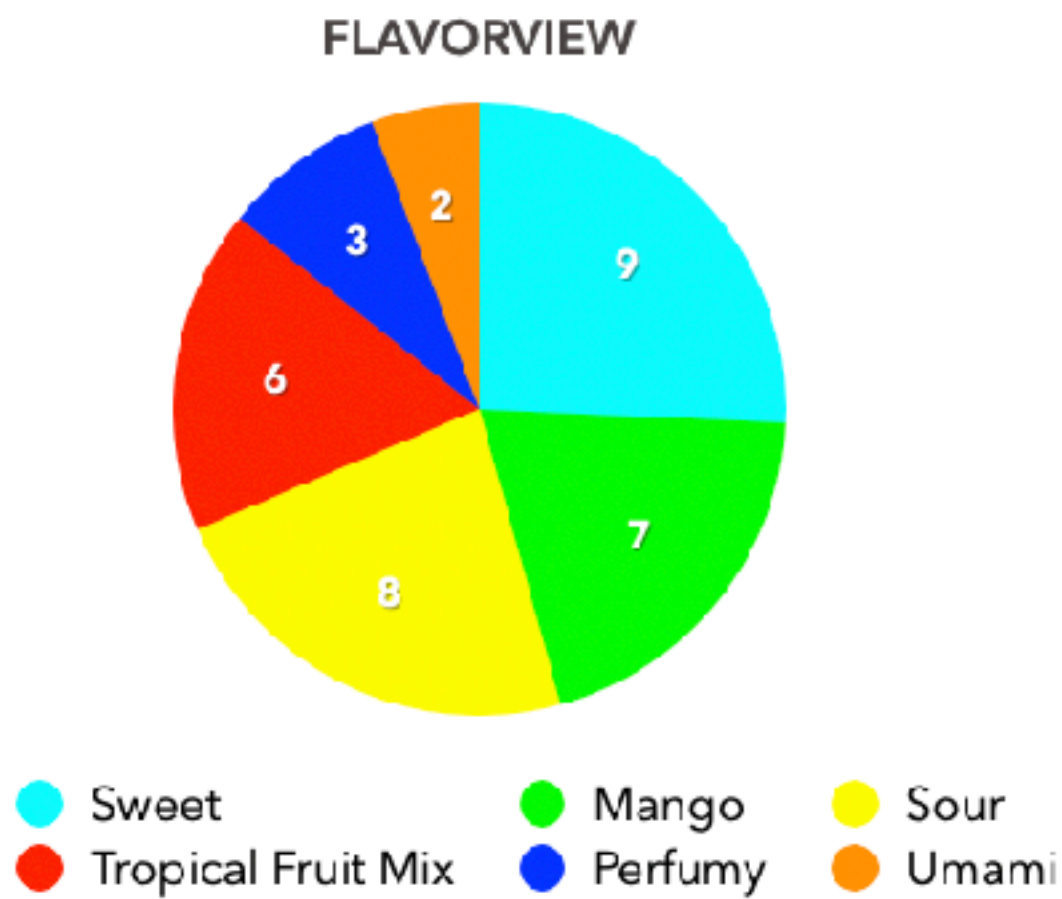
Assessment: 2 oz. sample, defrosted to room temperature

| | |
|------------------------|---|
| Appearance: | #C1A044 100-150-50 nix |
| Color Range | Green/Yellow |
| Size | 1.5cm x 1.5 cm |
| Aroma: | Tropical fruit, Citrus |
| Flavor Release: | Fast |
| Texture: | Slippery, dissolved quickly, perceivable hardness, low fiber |
| Aftertaste: | Mango, Sour |

Flavor - In Order of Appearance Intensity (1-15)

| | |
|--------------------|---|
| Sweet | 9 |
| Mango | 7 |
| Sour | 8 |
| Tropical Fruit Mix | 6 |
| Perfumy | 3 |
| Umami | 2 |

Notes:



Kent



CERTIFICATE OF ANALYSIS

Date of Shipment: July 29, 2021
Product: Mango IQF Chunk Kent
Item Number: NA
Quantity: 1 case / 20 lbs
Product Origin (COO): Mexico

PO 274211X
Doc. 99 AE
Customer: Attribute Analysis

| Analytical Testing | | | | | | | | | |
|------------------------|------|-----|------|--------|-----|---------|-------|--------|-----------|
| Production/ Lot Number | Brix | pH | Odor | Flavor | HEM | Foreign | Color | Defect | Character |
| 20221 | 14.1 | 3.5 | OK | OK | 0 | 0 | OK | OK | OK |

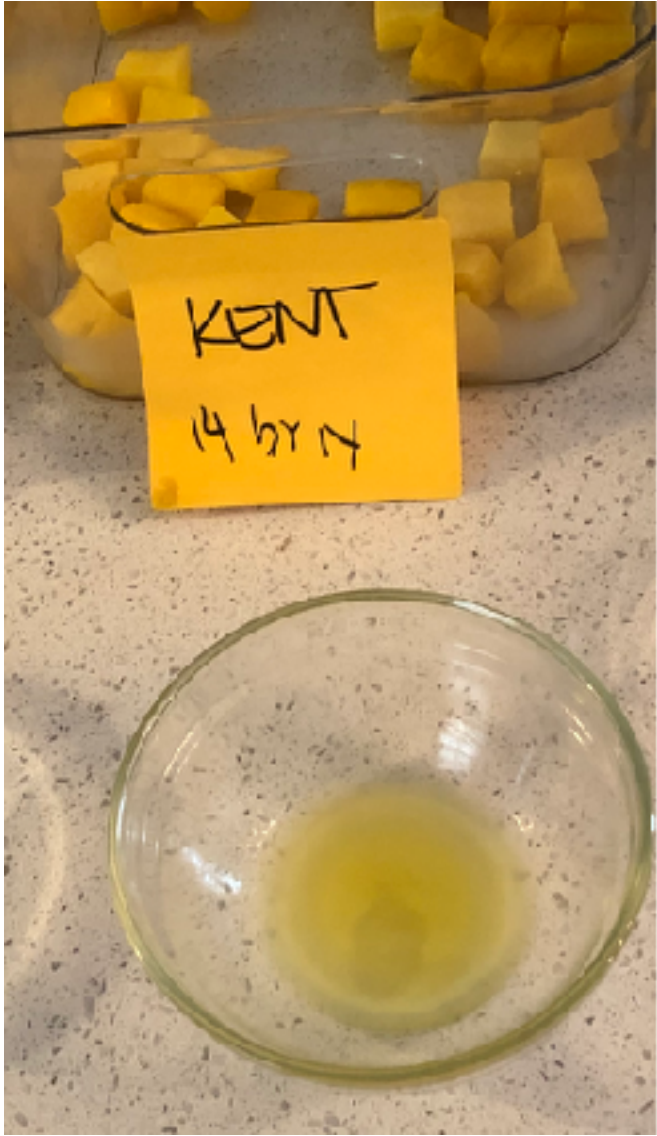
| Microbiological Results | | | | | | | | |
|-------------------------|-----------|-------------|------------|------------------|----------|-----------------|--------------|-----------------|
| Production/ Lot Number | SPC CFU/g | Yeast CFU/g | Mold CFU/g | Total Coli CFU/g | E. Coli | Salmonella /25g | L. mono /25g | S. Aureus CFU/g |
| 20221 | 3,800 | 1,100 | 970 | <10 | Negative | Negative | Negative | <10 |

| PACKING LIST | | | |
|------------------------|-----------------|-----------------|-----------------|
| Production/ Lot Number | Quantity, cases | Manufature Date | Expiration Date |
| 20221 | 2 | 21-Jul-21 | 22-Jul-23 |
| Total | 2 | | |

Yazmin Alvarez
Quality Control



| | |
|---------------------------------|-------------------|
| Product Type | Frozen Mango Kent |
| Received | July 30, 2021 |
| Maintained Storage Temperature | 0 ‘ |
| Supplier/Lot Code | Patagonia/ 20221 |
| Test Method— Brix Refractometer | 14 |



Descriptive Analysis Profile

Product: Frozen Keitt Mango Chunks
Supplier: Patagonia Foods
Lot Code:
Category: Frozen Fruit
Evaluation Date: July 15 - Sept. 15 2021
Assessment: 2 oz. sample, defrosted to room temperature

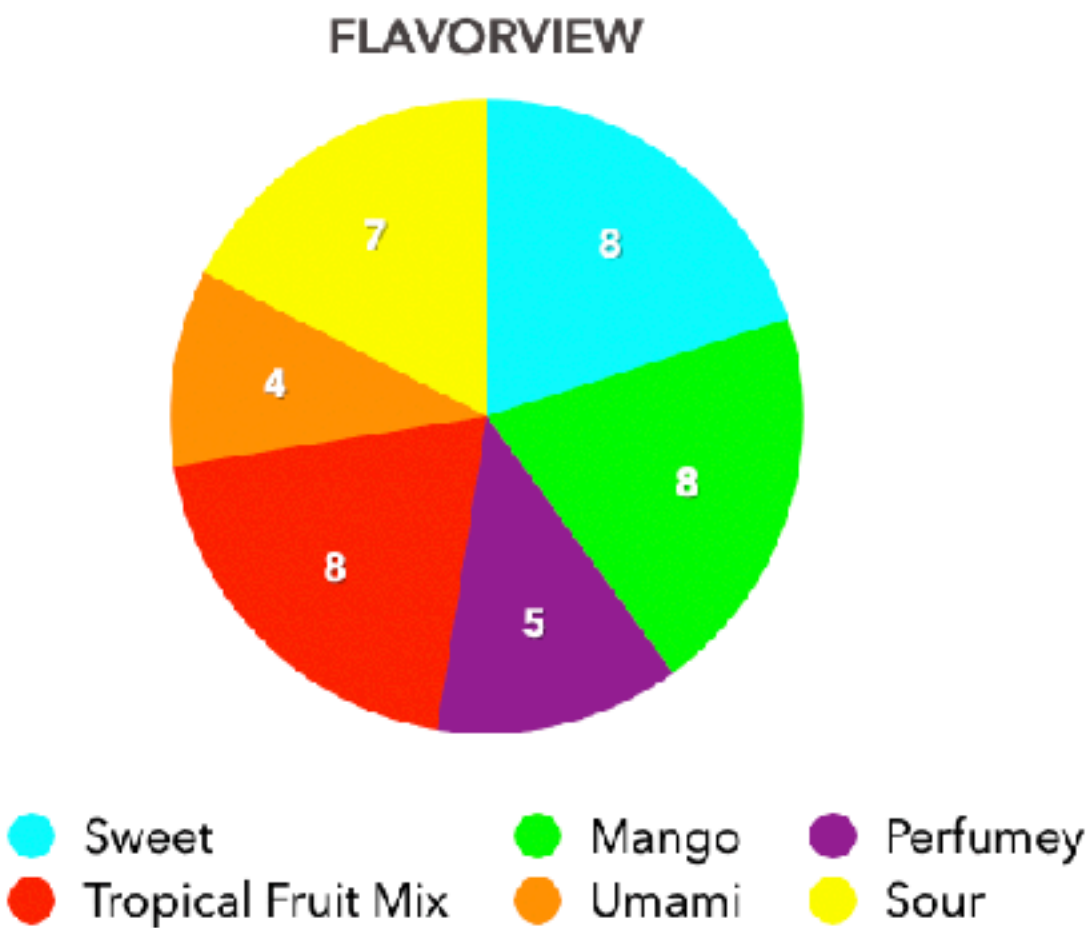
| | |
|-------------|--|
| Appearance: | <div>#D4A345 999-999-999</div> <div>nix</div> |
| Color Range | Yellow/Orange |
| Size | 1.5cm x 1.5cm |
| Aroma: | Tropical fruit, fresh squeezed orange, perfumy |

| | |
|-----------------|--|
| Flavor Release: | Fast |
| Texture: | Slippery, dissolved moderately, low hardness scale, low fibers |

| | |
|-------------|--------------|
| Aftertaste: | Mango, sweet |
|-------------|--------------|

| Flavor - In Order of Appearance - Intensity | |
|---|---|
| Sweet | 8 |
| Mango | 8 |
| Perfumey | 5 |
| Tropical Fruit Mix | 8 |
| Umami | 4 |
| Sour | 7 |

Notes:



Keitt



CERTIFICATE OF ANALYSIS

| | | | |
|-----------------------|-----------------------|-----------|---------------------|
| Date of Shipment: | September 2, 2021 | PO | 274211X |
| Product: | Mango IQF Chunk Keitt | Doc. | 109 AE |
| Item Number: | NA | Customer: | Attribute Analytics |
| Quantity: | 1 case / 20 lbs | | |
| Product Origin (COO): | Mexico | | |

| Analytical Testing | | | | | | | | | |
|------------------------|------|-----|------|--------|-----|---------|-------|--------|-----------|
| Production/ Lot Number | Brix | pH | Odor | Flavor | HEM | Foreign | Color | Defect | Character |
| 23921 | 12 | 3.3 | OK | OK | 0 | 0 | OK | OK | OK |

| Microbiological Results | | | | | | | | |
|-------------------------|-----------|-------------|------------|------------------|----------|-----------------|--------------|-----------------|
| Production/ Lot Number | SPC CFU/g | Yeast CFU/g | Mold CFU/g | Total Coli CFU/g | E. Coli | Salmonella /25g | L. mono /25g | S. aureus CFU/g |
| 23921 | 2,200 | 1,200 | 170 | <10 | Negative | Negative | Negative | <10 |

| PACKING LIST | | | |
|------------------------|-----------------|-----------------|-----------------|
| Production/ Lot Number | Quantity, cases | Manufature Date | Expiration Date |
| 23921 | 1 | 27-Aug-21 | 28-Aug-23 |
| Total | 1 | | |

Yazmin Alvarez
Quality Control



| | |
|---------------------------------|--------------------|
| Product Type | Frozen Mango Keitt |
| Received | Sept. 2, 2021 |
| Maintained Storage Temperature | 0 ‘ |
| Supplier/Lot Code | Patagonia/ 23921 |
| Test Method— Brix Refractometer | 12 |



Descriptive Analysis Profile

Product: Frozen Tommy Mango Chunks

Supplier: Patagonia Foods

Lot Code:

Category: Frozen Fruit

Evaluation Date: July 15 - Sept. 15 2021

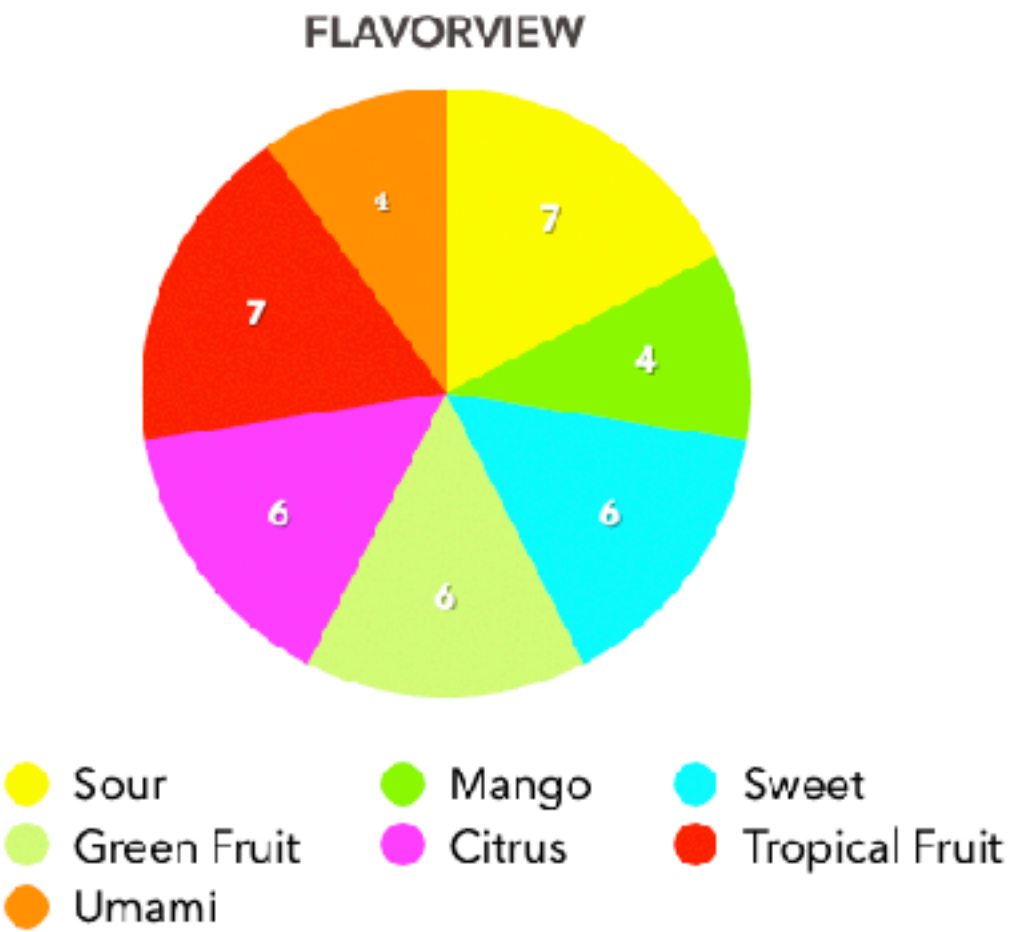
Assessment: 2 oz. sample, defrosted to room temperature

| | |
|------------------------|---|
| Appearance: | <div>#BDE70E 12C 12E 14</div> <div>nix</div> |
| Color Range | Yellow/Orange |
| Size | 2cm x 2cm |
| Aroma: | Tropical fruit, perfumy, green fruit |
| Flavor Release: | Fast |
| Texture: | Slippery, chewy, moderate hardness scale, moderate fiber |
| Aftertaste: | Tropical Fruit |


Flavor - In Order of Appearance - Intensity (1-15)

| | |
|----------------|---|
| Sour | 7 |
| Mango | 4 |
| Sweet | 6 |
| Green Fruit | 6 |
| Citrus | 6 |
| Tropical Fruit | 7 |
| Umami | 4 |

Notes:



Tommy



PATAGONIA FOODS

CERTIFICATE OF ANALYSIS

Date of Shipment: July 29, 2021

Product: Mango IQF Chunk Tommy

Item Number: NA

Quantity: 1 case / 20 lbs

Product Origin (COO): Mexico

PO 274211X

Doc. 99 AE

Customer: Attribute Analytics

| Analytical Testing | | | | | | | | | |
|------------------------|------|-----|------|--------|-----|---------|-------|--------|-----------|
| Production/ Lot Number | Brix | pH | Odor | Flavor | HEM | Foreign | Color | Defect | Character |
| 20121 | 12.5 | 3.5 | OK | OK | 0 | 0 | OK | OK | OK |

| Microbiological Results | | | | | | | | |
|-------------------------|-----------|-------------|------------|------------------|----------|-----------------|--------------|-----------------|
| Production/ Lot Number | SPC CFU/g | Yeast CFU/g | Mold CFU/g | Total Coli CFU/g | E. Coli | Salmonella /25g | L. mono /25g | S. Aureus CFU/g |
| 20121 | 3,500 | 900 | 970 | <10 | Negative | Negative | Negative | <10 |

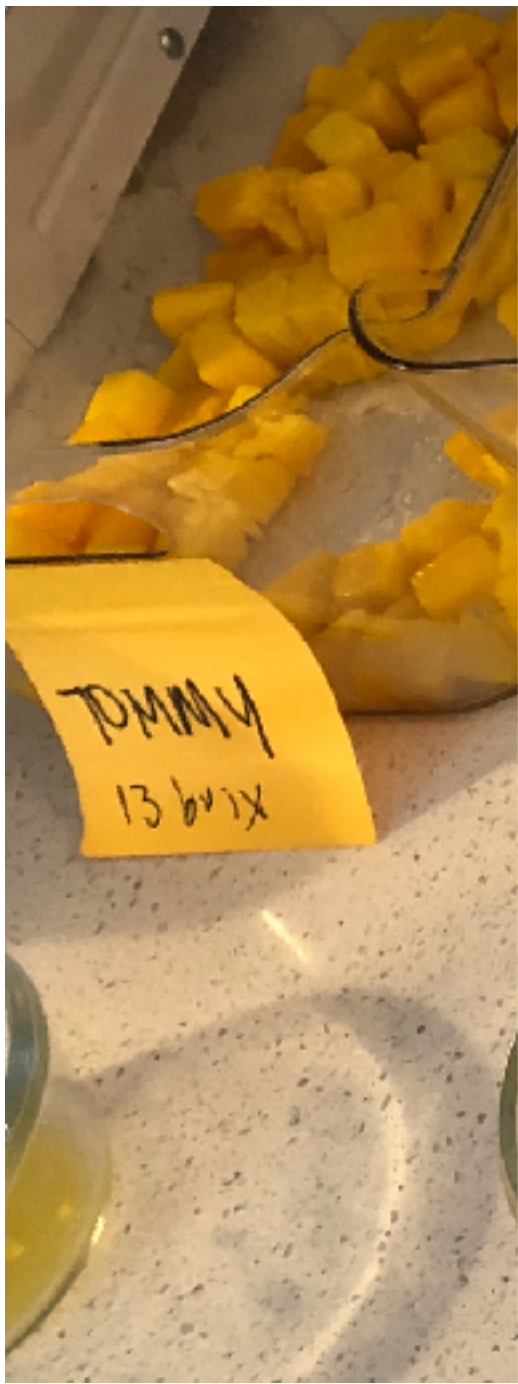
| PACKING LIST | | | |
|------------------------|-----------------|-----------------|-----------------|
| Production/ Lot Number | Quantity, cases | Manufature Date | Expiration Date |
| 20121 | 2 | 21-Jul-21 | 22-Jul-23 |
| Total | 2 | | |

Yazmin Alvarez

Quality Control



| | |
|---------------------------------|--------------------|
| Product Type | Frozen Mango Tommy |
| Received | July 30, 2021 |
| Maintained Storage Temperature | 0 ‘ |
| Supplier/Lot Code | Patagonia/ 20121 |
| Test Method— Brix Refractometer | 13 |





Descriptive Analysis Profile

Product: Frozen Edward Mango Chunks


Supplier: Patagonia Foods

Lot Code:

Category: Frozen Fruit

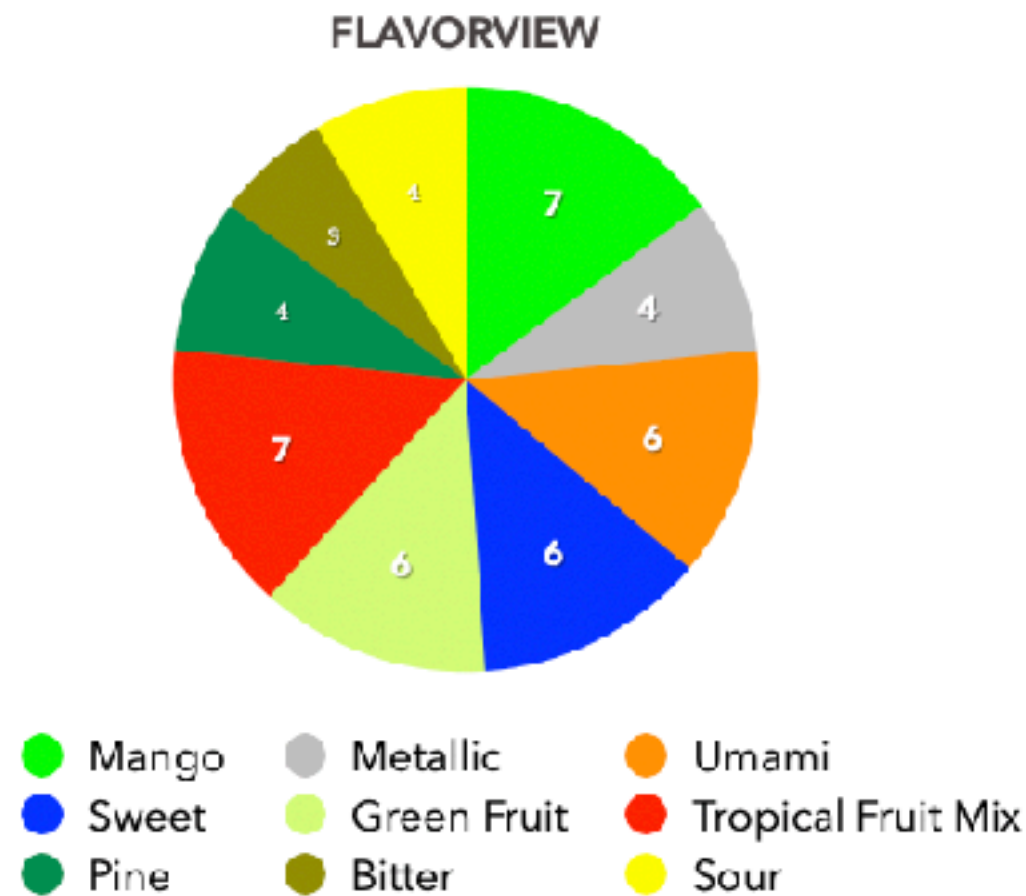
Evaluation Date: July 15 - Sept. 15 2021

Assessment: 2 oz. sample, defrosted to room temperature

| | |
|------------------------|--|
| Appearance: |  |
| Color Range | Green/Orange |
| Size | 3cm x 2cm |
| Aroma: | Tropical fruit, fresh orange, pine |
| Flavor Release: | Fast |
| Texture: | Slippery, dissolved moderately, low hardness scale, low fiber |
| Aftertaste: | Green Mango, Tropical Fruit, Perfume |

Flavor - In Order of Appearance - Intensity (1-15)

| | |
|--------------------|---|
| Mango | 7 |
| Metallic | 4 |
| Umami | 6 |
| Sweet | 6 |
| Green Fruit | 6 |
| Tropical Fruit Mix | 7 |
| Pine | 4 |
| Bitter | 3 |
| Sour | 4 |

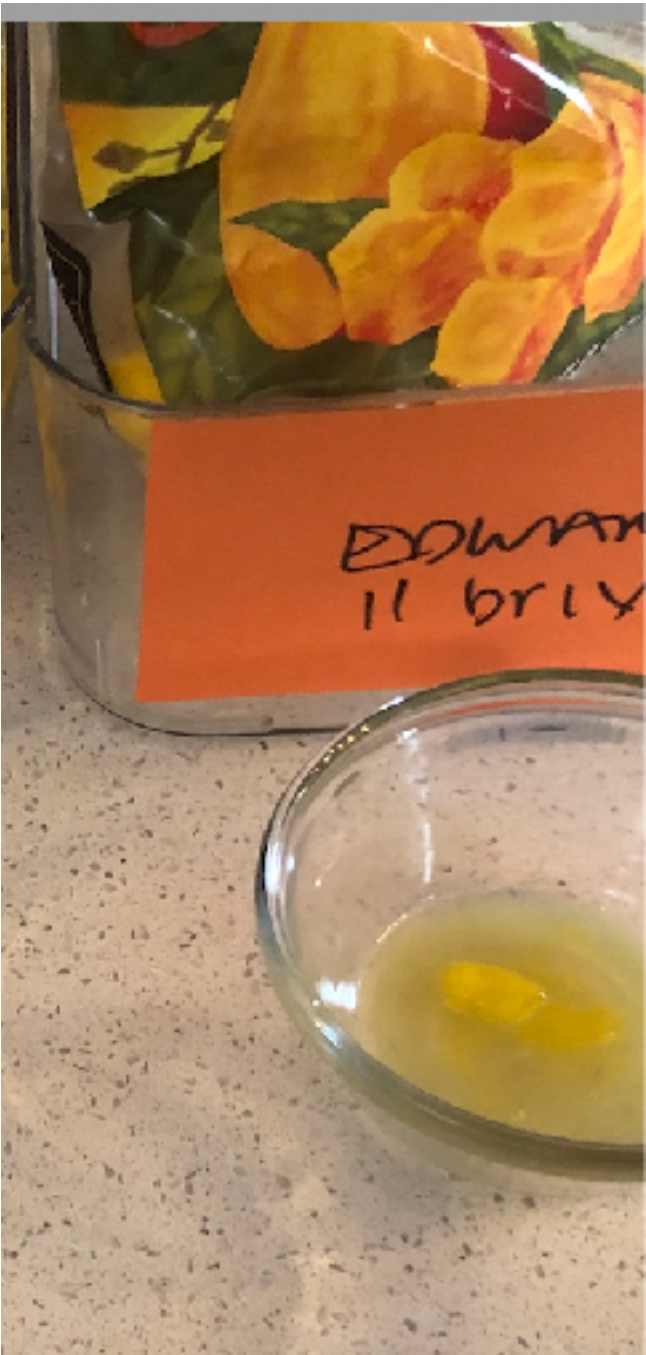


Notes:

Edward



| | |
|---------------------------------|---------------------|
| Product Type | Frozen Mango Edward |
| Received | April 2021 |
| Maintained Storage Temperature | 0 ° |
| Supplier/Lot Code | Peru/Trader Joes |
| Test Method— Brix Refractometer | 11 |

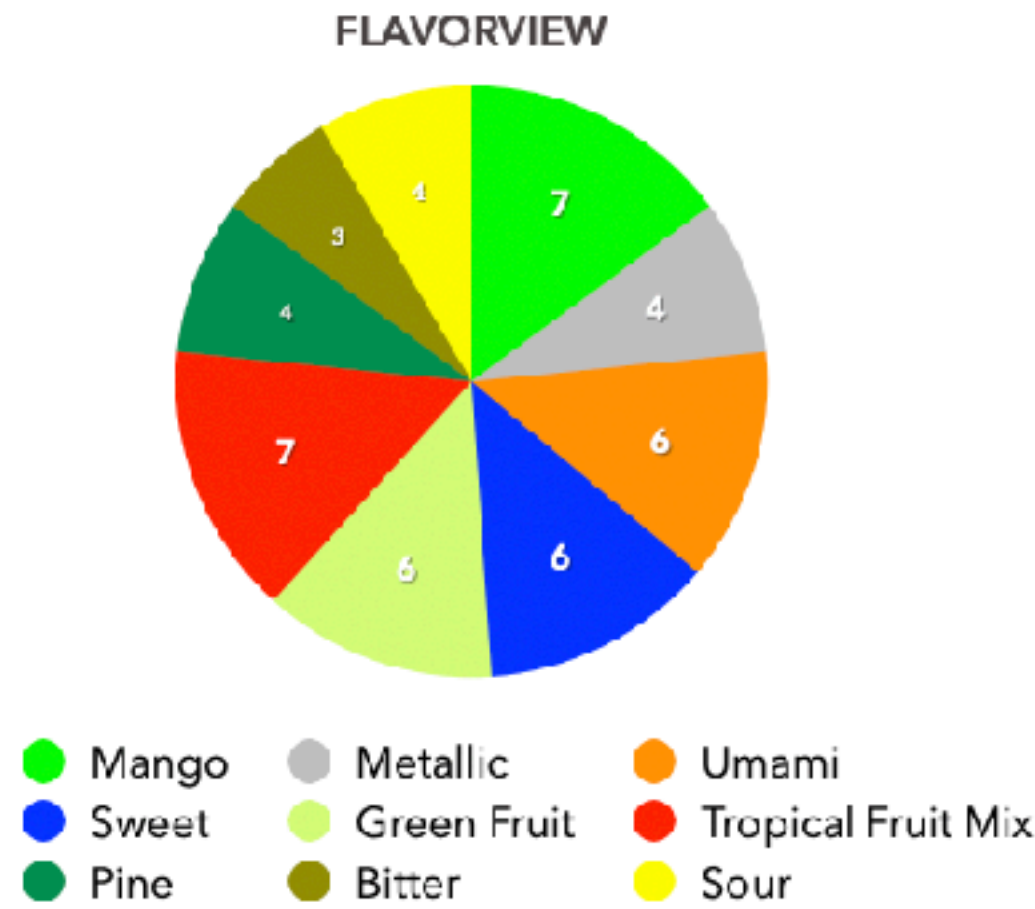
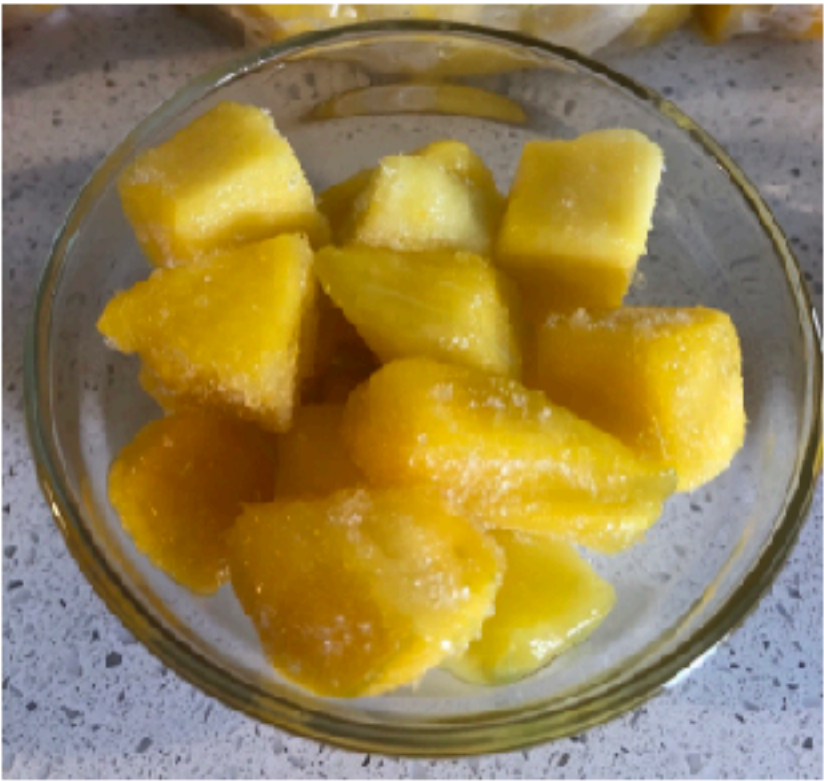


Descriptive Analysis Profile

Product: Frozen Edward Mango Chunks
Supplier: Patagonia Foods
Lot Code:
Category: Frozen Fruit
Evaluation Date: July 15 - Sept. 15 2021
Assessment: 2 oz. sample, defrosted to room temperature

| | |
|-----------------|---|
| Appearance: | <div><div>VB 2A31</div><div>479 490 496</div><div>nix</div></div> |
| Color Range | Green/Orange |
| Size | 3cm x 2cm |
| Aroma: | Tropical fruit, fresh orange, pine |
| Flavor Release: | Fast |
| Texture: | Slippery, dissolved moderately, low hardness scale, low fiber |
| Aftertaste: | Green Mango, Tropical Fruit, Perfume |

| Flavor - In Order of Appearance - Intensity (1-15) | | |
|--|--|---|
| Mango | | 7 |
| Metallic | | 4 |
| Umami | | 6 |
| Sweet | | 6 |
| Green Fruit | | 6 |
| Tropical Fruit Mix | | 7 |
| Pine | | 4 |
| Bitter | | 3 |
| Sour | | 4 |

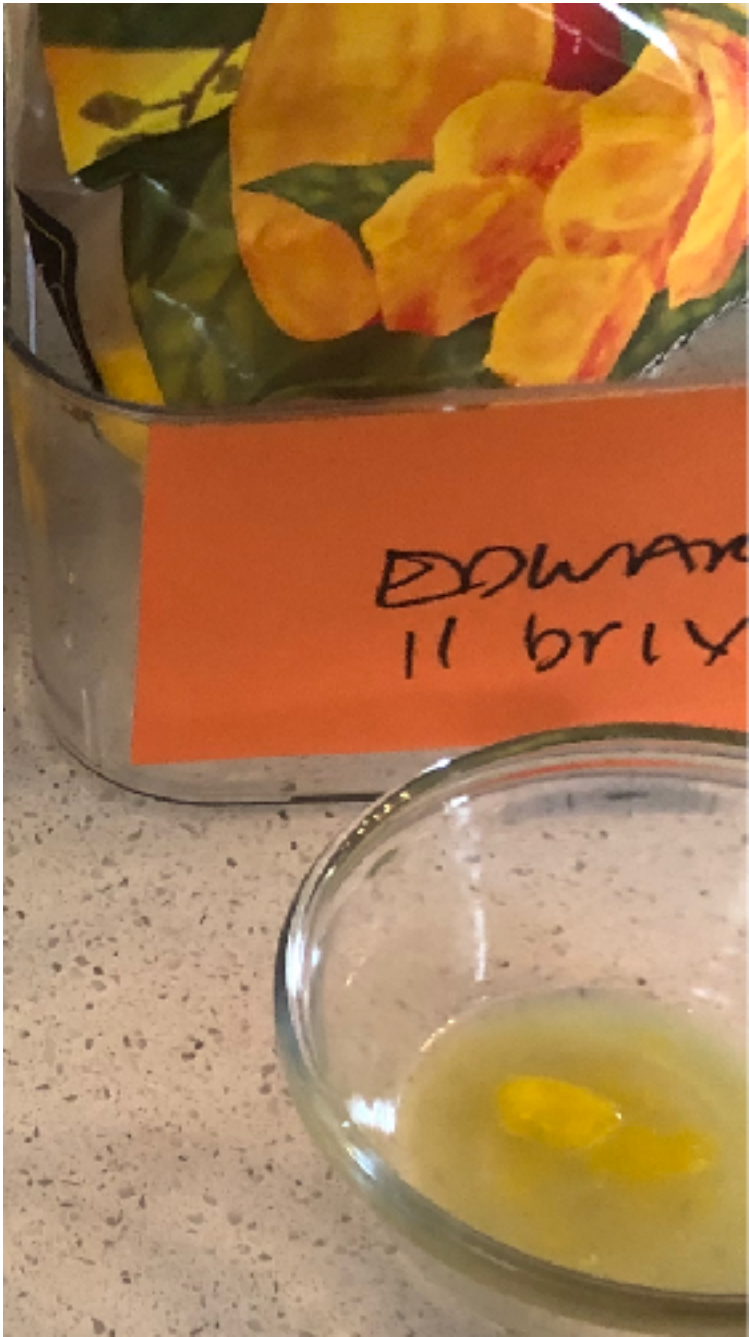


Notes:

Edward



| | |
|---------------------------------|---------------------|
| Product Type | Frozen Mango Edward |
| Received | April 2021 |
| Maintained Storage Temperature | 0 ‘ |
| Supplier/Lot Code | Trader Joe’s/Peru |
| Test Method— Brix Refractometer | 11 |





Descriptive Analysis Profile

Product: Frozen Edward Mango Chunks


Supplier: Patagonia Foods

Lot Code:

Category: Frozen Fruit

Evaluation Date: July 15 - Sept. 15 2021

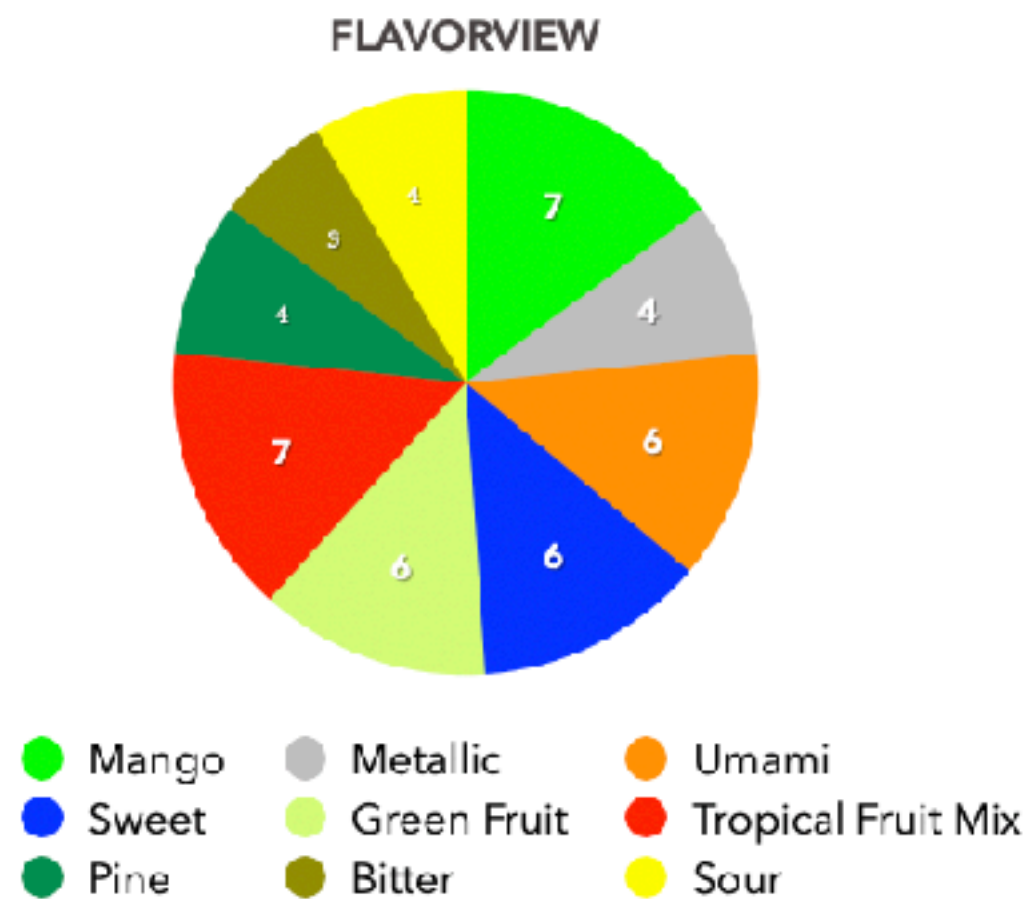
Assessment: 2 oz. sample, defrosted to room temperature

| | |
|------------------------|--|
| Appearance: |  |
| Color Range | Green/Orange |
| Size | 3cm x 2cm |
| Aroma: | Tropical fruit, fresh orange, pine |
| Flavor Release: | Fast |
| Texture: | Slippery, dissolved moderately, low hardness scale, low fiber |
| Aftertaste: | Green Mango, Tropical Fruit, Perfume |

Flavor - In Order of Appearance - Intensity (1-15)

| | |
|--------------------|---|
| Mango | 7 |
| Metallic | 4 |
| Umami | 6 |
| Sweet | 6 |
| Green Fruit | 6 |
| Tropical Fruit Mix | 7 |
| Pine | 4 |
| Bitter | 3 |
| Sour | 4 |

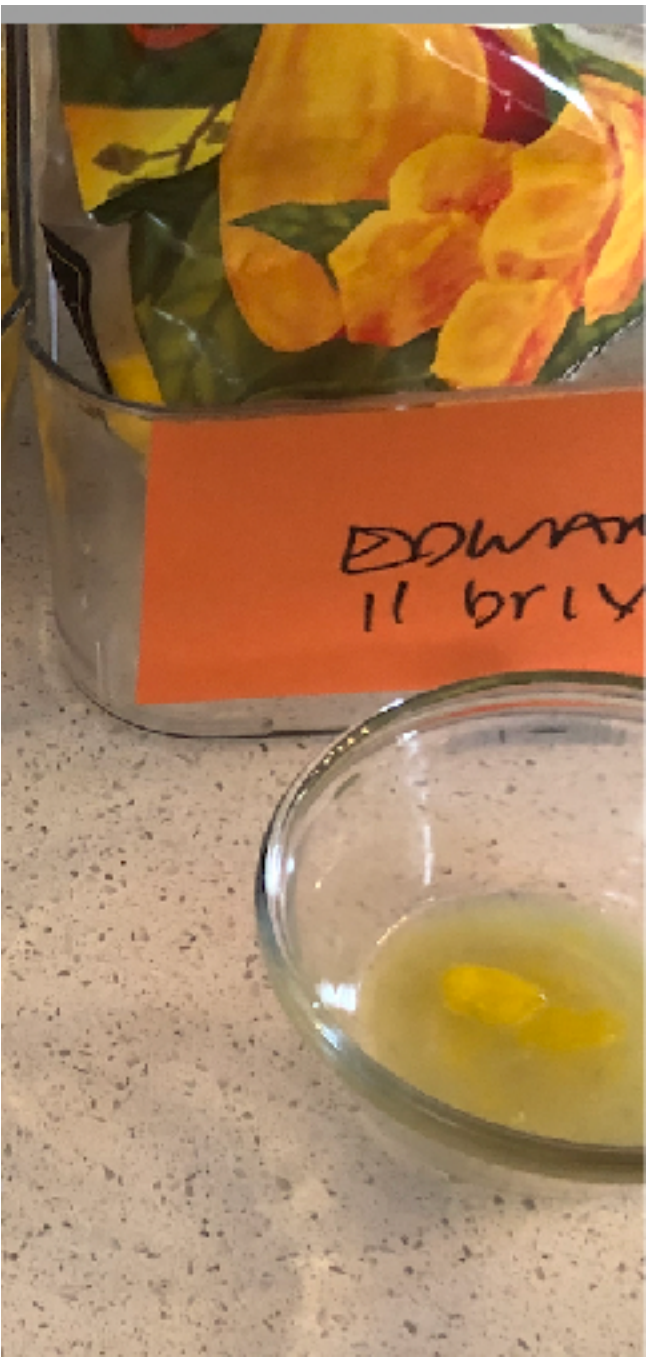
Notes:



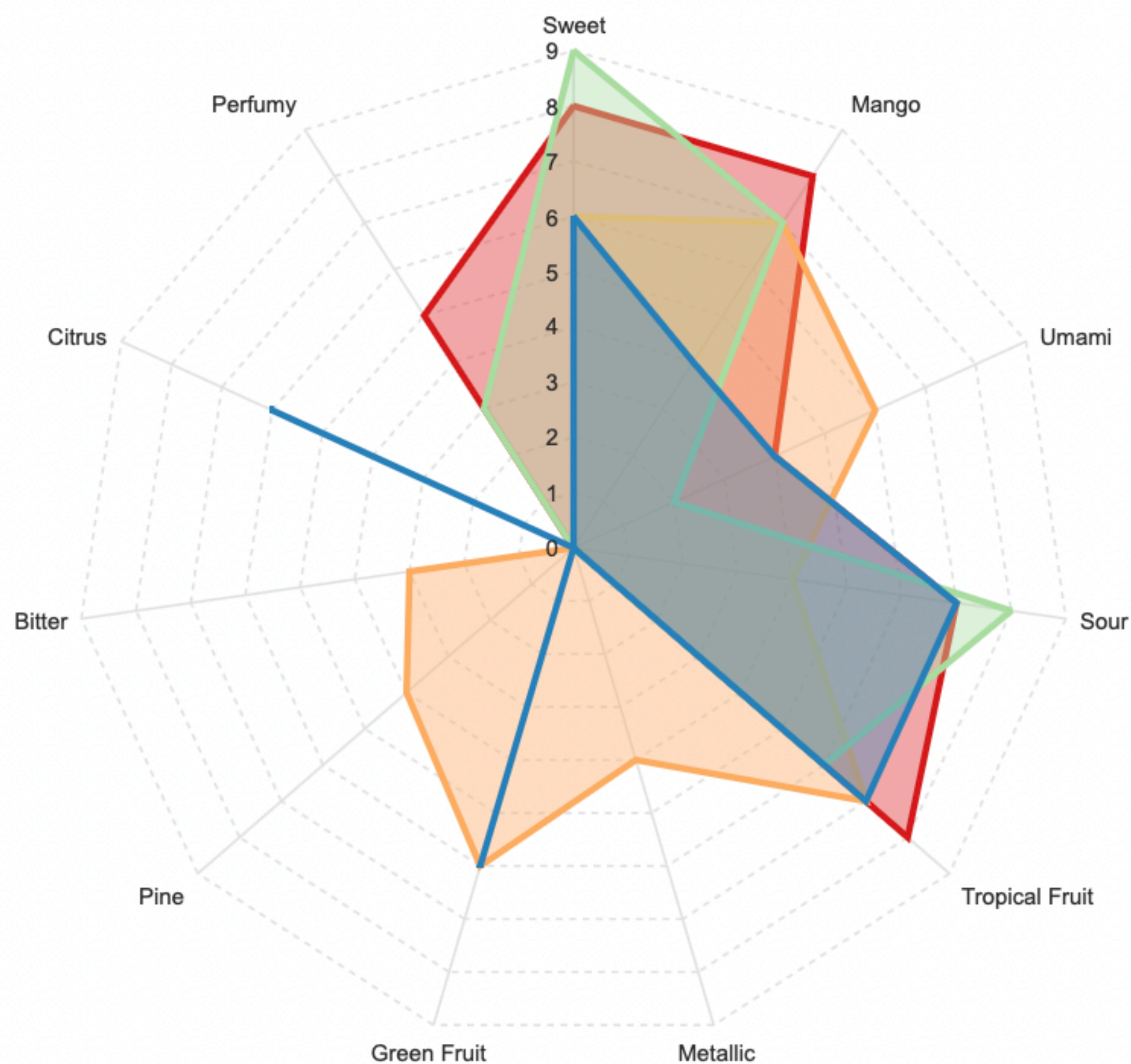
Edward



| | |
|---------------------------------|---------------------|
| Product Type | Frozen Mango Edward |
| Received | April 2021 |
| Maintained Storage Temperature | 0 ° |
| Supplier/Lot Code | Peru/Trader Joes |
| Test Method— Brix Refractometer | 11 |



Mango Flavor Attributes Visualized



The spider graph at left visualizes and compares frozen mango varieties using descriptive analysis data.

The attributes of four varieties: Keitt, Edward, Kent and Tommy were assessed by a trained sensory panel.

Following, flavors were plotted on a graph using attributes and numerical intensity number.

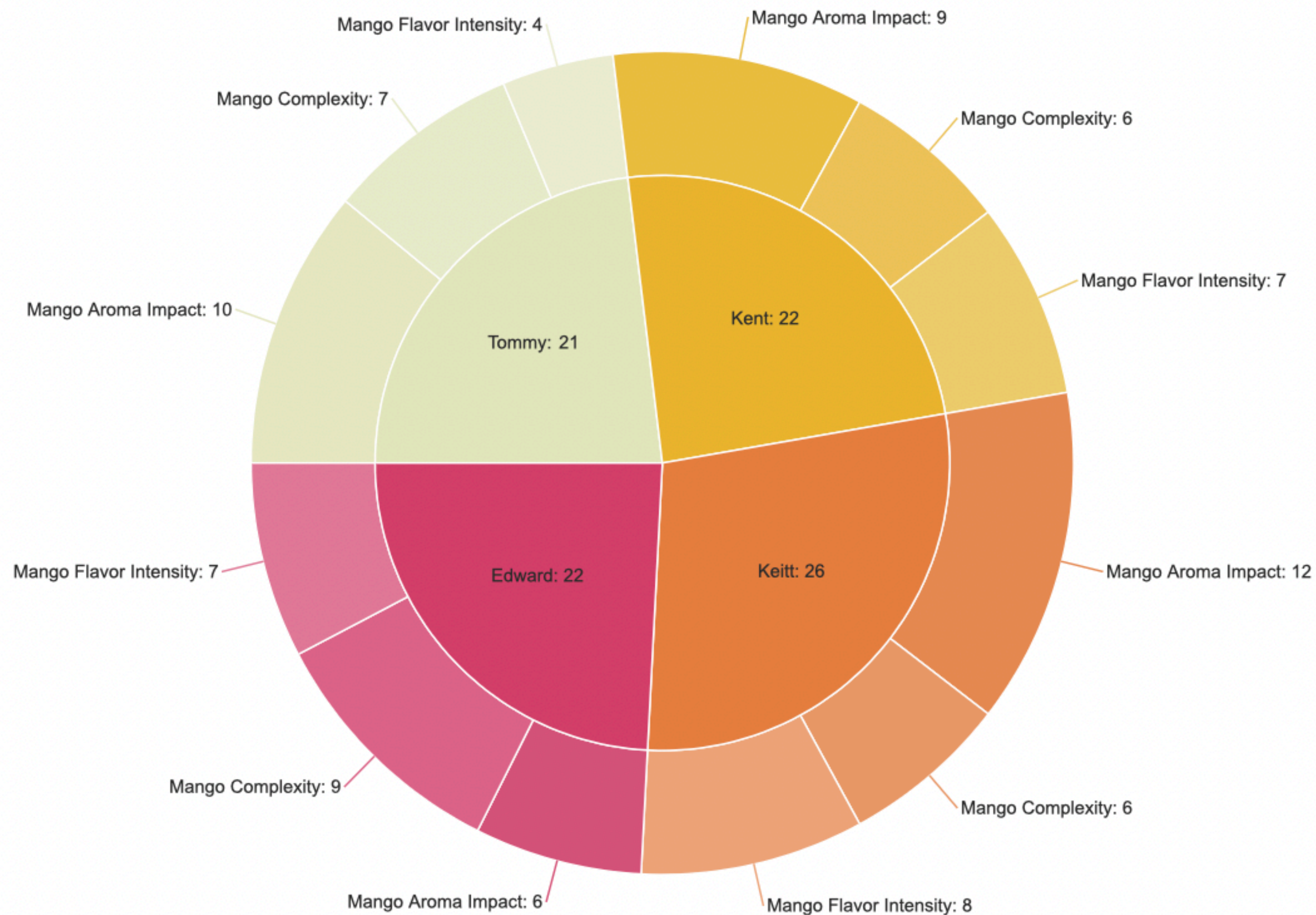
Mango is an edible stone fruit produced by the tropical tree *Mangifera indica* which is believed to have originated in southern Asian.

Mango can contain a variety of flavors from perfume to pine which makes it very evocative to humans and one of the top trending fruit flavors in the world.

Shared terms and intensities for specific mango attributes were plotted on a graph to compare the mango varieties tested.

Please see the MANGO Lexicon chart for term definitions.

Overall Frozen Mango Summary



Using frozen mango Kent, Keitt, Edward and Tommy Descriptive Analysis data points, Attribute Analytics devised a **frozen mango summary or scorecard**. The following data was used to assign a numerical number to each product for an overall score.

Mango Complexity = The number of specific attributes associated with the mango variety.

Mango Flavor Intensity = Using a universal 15-point intensity scale the panel assigned a number specific to the strength or intensity of the mango flavor within each variety.

Mango Aroma Impact = Using a universal 15-point scale the panel assigned an overall intensity number to the aroma.

Consumer Research

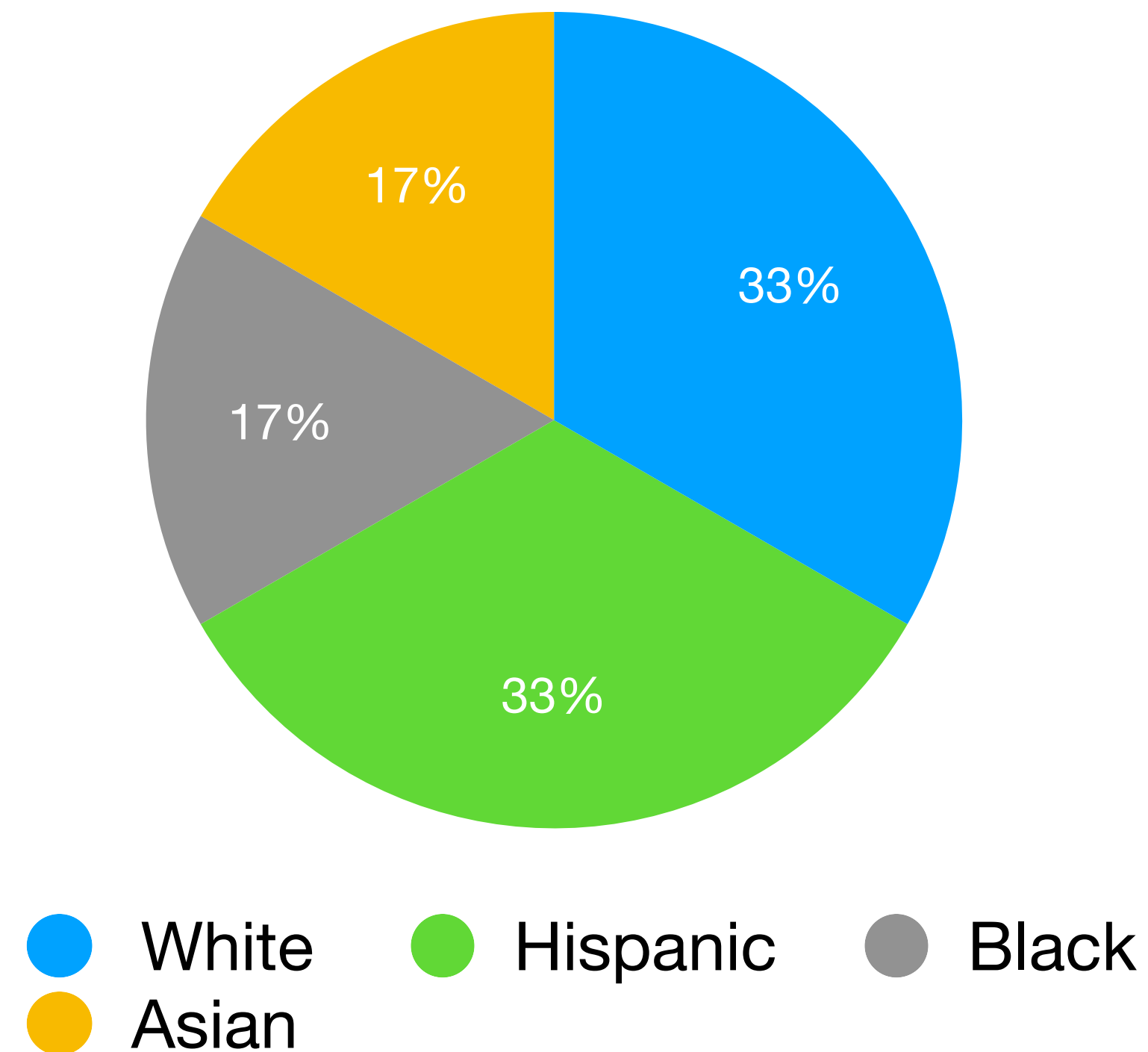
Focus Group for Qualitative Research and Insights on Frozen Mango

- A consumer focus group was conducted to gain an unbiased perspective and snapshot of opinions of frozen mango
- Consumers were screened, recruited based on heavy mango use.
- 12 frequent mango users met in rented conference space.
- Attribute Analytics conducted and moderated in-person, 2-hour session, paid consumers in Whole Foods Market gift cards.
- Consumers were orientated with a general mango discussion, they taste tested four varieties and answered questionnaire before participating in a group discussion.
- Gained understanding of taste and texture preferences, language and mango sales and marketing opportunities.
- Obtained key insights and understanding around mango product usage.



Mango “super users” tasted four varieties: Keitt, Edward, Kent and Tommy. Mango pieces were thawed for focus group session.

Consumer Focus Group Demographics



There were 12 total consumer panel participants. 11 female panelists and 1 male panelists.

Consumers identified as: White (4), Asian (2), Black (2) and Hispanic (4) and were between ages of 25-55.

All having some college or post graduate degree.

All of the panelists consume mangos at least twice a month and had purchased frozen mango within the past three months.

Due to Covid-19, income level and employment information were not surveyed.

Consumer Research Insights & Highlights

Group Grounding Conversation

Sweet, juicy, has a pit. Like a
Popsical with no stick

Slightly sweet, slimy

Luxurious, juicy, flavorful

Light yellow = sour
Softer = sweeter. **Wide range**
of flavors and usage

Beautiful, creamy, **perfumy**
quality, festive and gorgeous

I am from Mexico and we have lots of
mango. We have all types, sizes and
flavors. Can tell by looking at them
what's good. We eat as snack not in
dishes. **Creamy, sweet**, some have
fibers.

**How Would
You
Describe
Mango to
Someone
Who Had
Never Eaten
It?**

Small, football shape, judge
ripeness by red color

**Celebration in your
mouth and rainbow of
deliciousness.** It's so
beautiful. A big sticky
mess!

Lots of work but worth it
because it's like **a flavor
explosion and tastes like
sunshine**

Soft, juicy, **short window of
time, to eat, only 2 days**

Tropical fruit, fleshy,
juicy when ripe. **Silky.**



**Gaging consumer beliefs and perceptions
reveals customer attitudes and opinions about
Mango products.**

Consumer Research Insights & Highlights

Talk about one or two foods that you associate or eat with mango

Mango Pairing

Lime & Salt

Mango Chicken or Fish

Coconut & Spicy

Salsa

Adobo & Jerk Chicken

Pureed Mango

Lime & Cilantro

Frozen Treats - Ice Cream

Plain — As is!

Tajin

Milkshake

Passionfruit, Soursop or
Sorbet

Citrus, salt, avocado

Smoothie



Flavor Family



Attribute
Analytics

Consumer Research Insights & Highlights

What was your overall impression of these frozen mango products?

Frozen Mango Tasting, Questionnaire and Response Module

- Consistent with what I'd expect
- Surprised at how different they all were
- Wanted more sweet. When you taste side-by-side all very different.
- Some texture was sort of spongy and not as vibrant. Soft color = less flavor
- Types look similar but taste so different and have different textures. Each gave me a different feeling
- Not quite as good as fresh but I would make something with it.
- Did not get that burst of mango flavor and not delivering on fresh experience but so convenient.
- Texture is so important. These are good for smoothies.
- Should freeze when mango is overripe as some pieces are too hard and sour to eat



In a session designed for “super users”, 12 consumers tasted thawed whole mango pieces, as they would experience when at home and after purchasing in the store. For discussion they had access to mango products including: Soley Mango Jerky, fresh mangos, 365 Amelie dried mango, and Trader Joe's Dried Mango

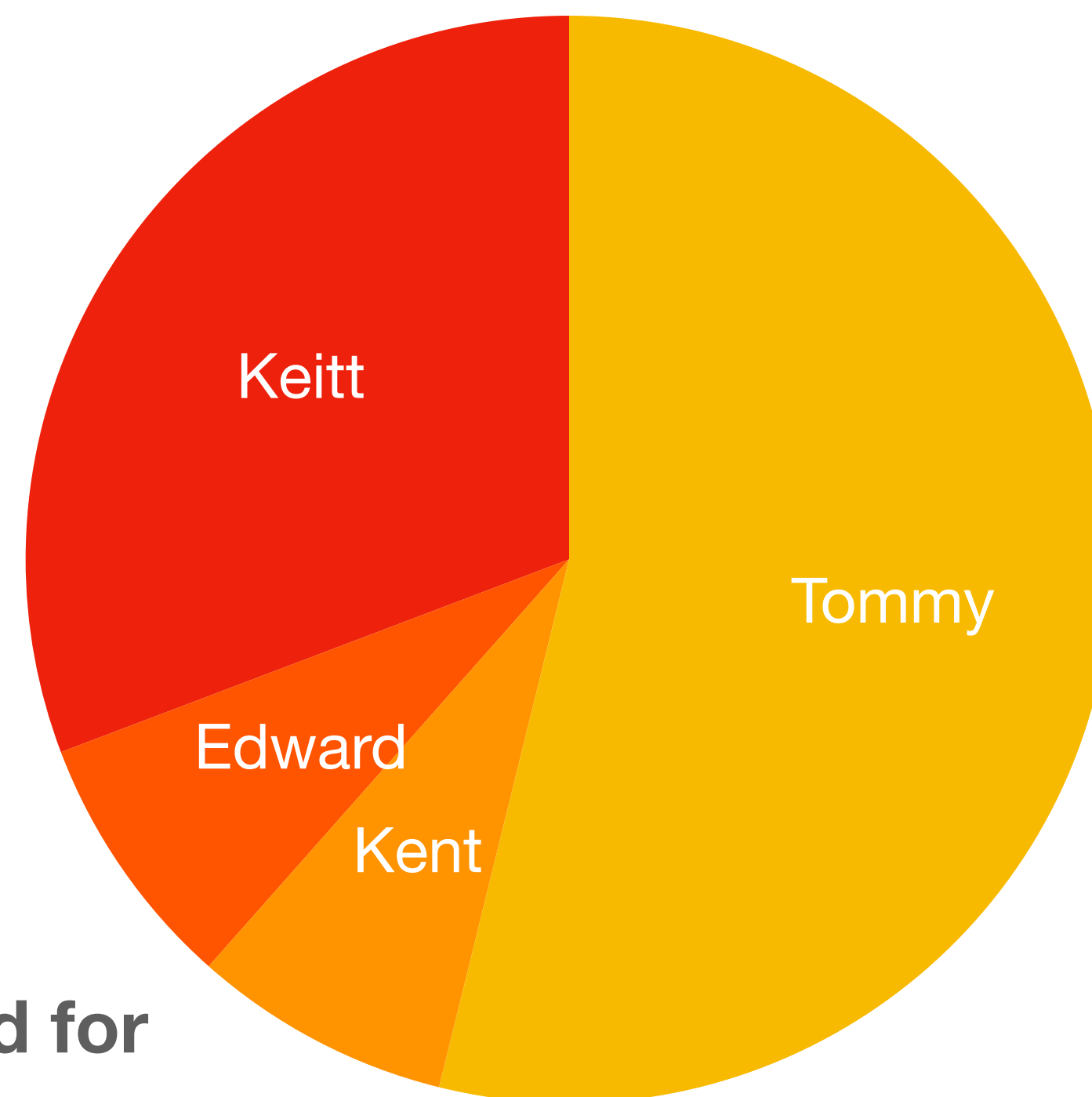
Consumer Research Insights & Highlights

Exploring Frozen Mango Varieties— *Talk about Your Favorite and Why* — Highlights

Color, texture and abundance of
mango flavor.
Great flavor.
Tastes like candy.
Sweetest with good texture. It
was my favorite and would buy
for my family.
Juicy, sweet.

Nice larger piece size!

Tart, good for
kids!



Exactly how I want my mango to taste.
Great flavor and couldn't tell it was
frozen.
Juicy and sweet.
Good consistency, sour and sweet.
Good color.
No aftertaste.
Sweet and sour.
Perfectly ripe.
Good texture.
Creamy texture.

What do you do with frozen mango?

Really convenient and ready-to-eat. Sweet treats. Sangria. Smoothies. Use as ingredient in many dishes. Frozen treats. Make salsa. As a side, serve with chicken.

Consumer Research Insights & Highlights

Share an idea to elevate mango!



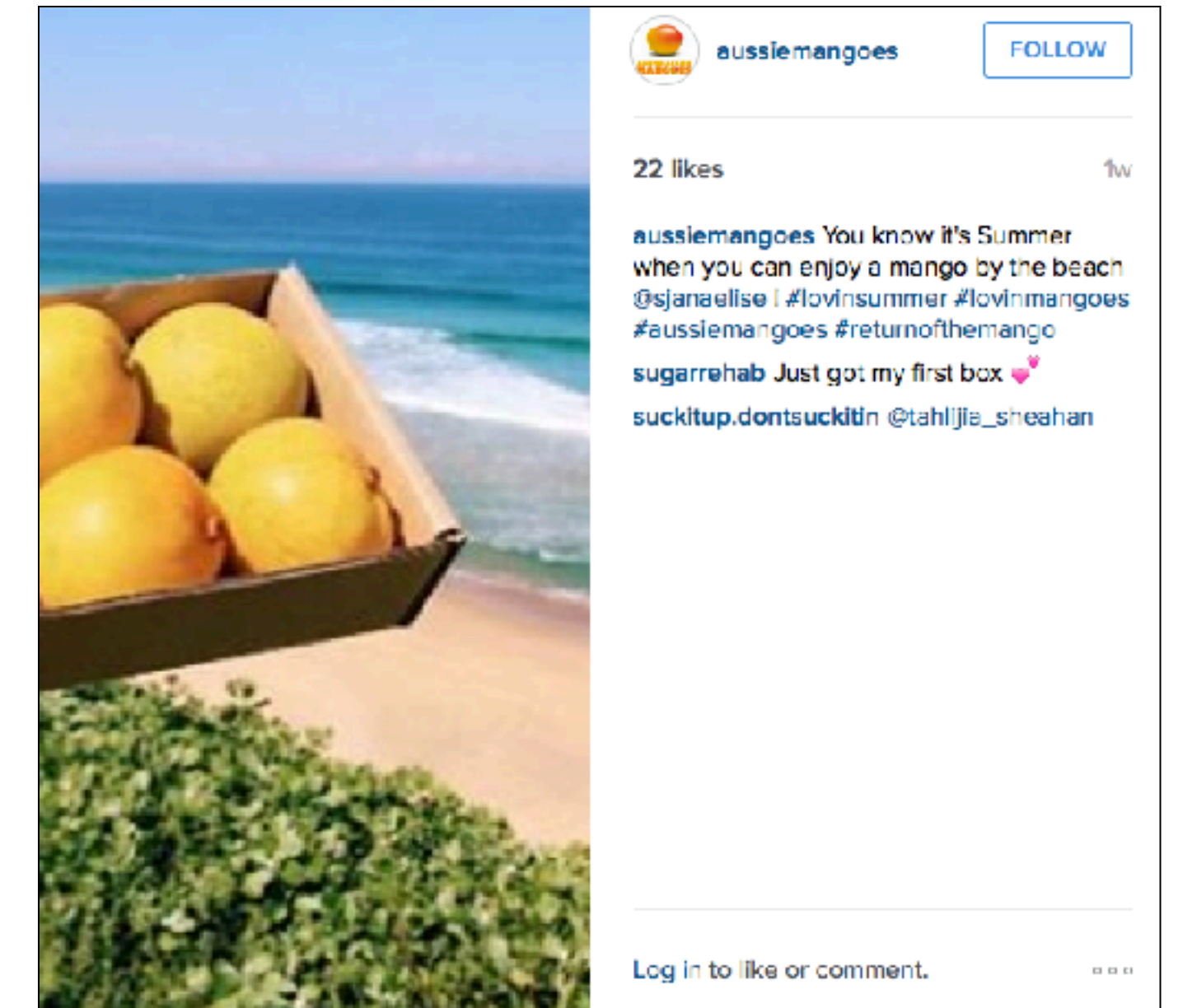
Ripeness & nutrition stickers on mango or frozen mango package



Honor the origin and growing region via marketing campaign



QR code for info on variety and it's "Mango Journey" providing transparency to end consumer



More social media influencers sharing about type and recipes

Consumer Research Insights & Highlights

Share an idea to elevate mango!



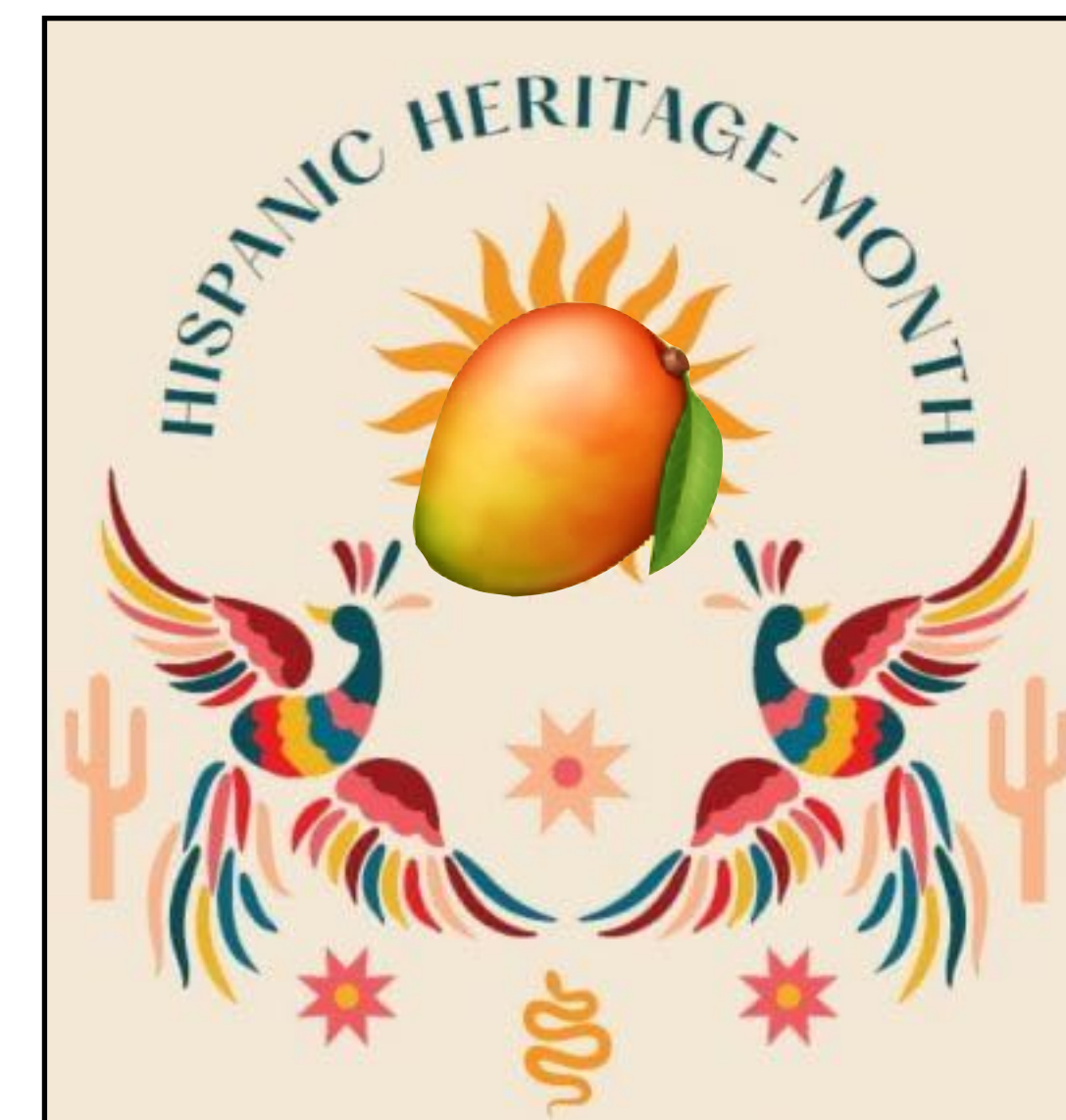
Sell frozen
chunks in cup
ready for
blending a “to-go
smoothie”



Sell by color and
ripeness level
from Green — to
“Marigold” or
Super Ripe



Offer frozen by
variety and
region



Celebrate Mango During
Hispanic Heritage Month

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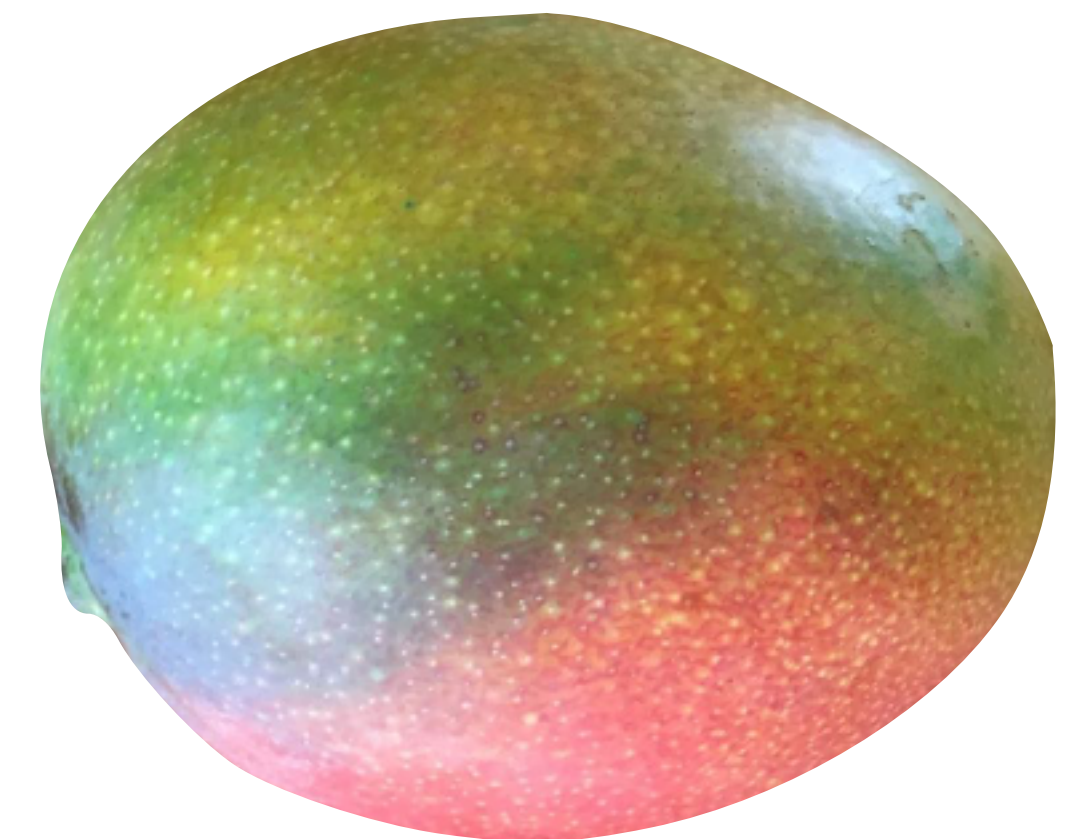
Larger cut frozen pieces for new applications “like grilling”. New Mango plant based burger like Jackfruit?



Co-brand with Tajin — added seasoning packs



Prepared & Cut Frozen Mango Salsa with avocado and citrus



Help consumers understand how to celebrate the mango rainbow!

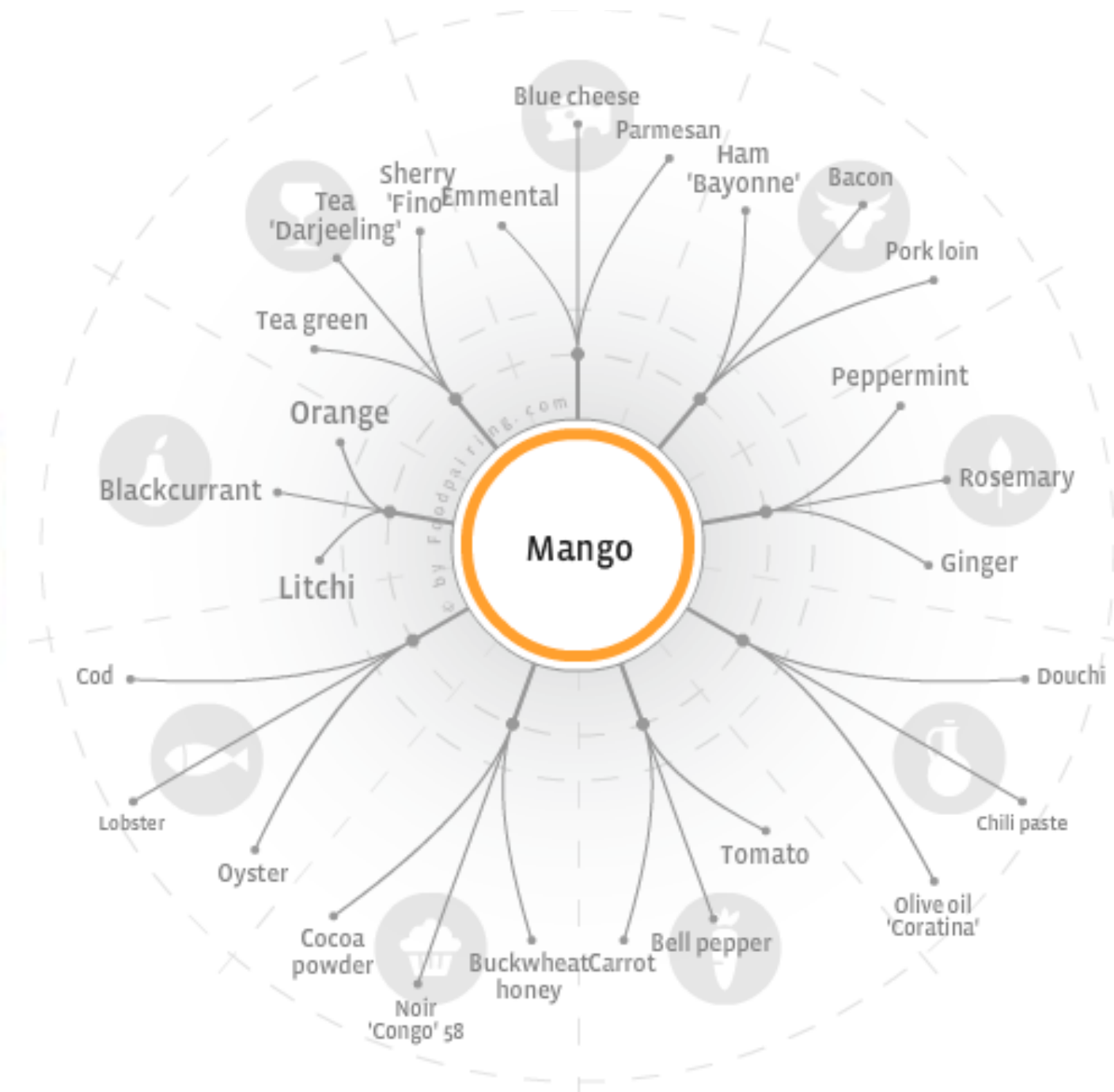
Attribute Analytics

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Package to convey
“Preciousness &
Luxurious” nature



More POS Info &
Education on
ripeness and
usage



Chef, restaurant
partnerships &
recipes —
“Grilled Mango”



More sealable, stylish
designed packaging
w/product
descriptions and
recipes

Category Quick View

Frozen Cut Mango — The Takeaway



Mango Category Quick View is a tool developed as an infographic.

It is based on key findings from research so readers and stakeholders can quickly interpret and correlate data sets.

Mango Research Summary & Conclusions

2021 Research Results Summary

1. Sensory and Quality attributes of four frozen mango cultivars - Kent, Keitt, Tommy, Edward

- Analyzed and developed Descriptive Analysis Profiles for each cultivar
- Developed lexicon or library of frozen mango attributes or descriptors
- Visualized attributes and intensities in profiles, plotted on graph, and captured data on summary chart for comparison

2. Qualitative research on Frozen Mango products for understanding key emotions, language and patterns

- Conducted “super mango user” moderated focus group
- Gained incredible consumer insights on frozen mango products

Key Conclusions

Frozen Mango Sensory Research — *Understanding frozen mango from sensory perspective*

1. Identified New Lexicon Terms and Defined Others — Pine, Sweet, Sour, Umami, Green Fruit, Tropical Fruit, Mango, Perfumy
 - Correlate to consumer terms for better understanding of frozen products, ways to market, and product naming
 - Develop quality standards and set “flavor” goals to bring more fresh-like attributes to frozen mango
 - Use to mitigate undesirable traits or off-notes like bitter and metallic
 - Standardize vocabulary and create a master lexicon for better industry and consumer communication
2. Analyzed and visualized descriptive data using profiles and charts
 - Determine mango product gold standards
 - Understand improvement opportunities at farm level or in production plants
 - Compare cultivar types and understand key differences between fresh and frozen product

Mango Research Summary & Conclusion

Key Conclusions

Frozen Mango Consumer Insights — *Understanding frozen mango from a consumer perspective*

1. **Key vocabulary terms** — leads us to usage opportunities, and understanding about what's important to consumers in their own terms— “Popsical with no stick” (natural summertime treat), “Luxurious” (maybe more costly fruit but has uniquely elevated status), “Gorgeous” (symbol of beauty), “Silky” (enjoy smooth texture, low fiber), “Tastes like Sunshine” (symbolizing positive emotions and strong energy) and “Marigolds” (vibrant color and strong flavor preference emerged).
2. **What matters** — Intense mango flavor, ripeness level, soft, non-fibrous texture, response to bold color, more ways to make the fruit convenient from cups to larger size. Can echo back these terms and concepts when marketing, selling, naming new varieties, describing, and developing product.
3. **Usage Deep Dive** — How they use the product — Sweet Treats, Sangria & Frozen cocktails, Smoothies, Sorbet, Salsas and Side dishes — Answers how to support consumers by providing more recipes and usage ideas. Also helps us generate ideas to get consumer to use mango in unique ways and occasions.
4. **Mango Flavor Family** — Correlating other products like Lime, Coconut, Salt, Spice, Passionfruit, Avocado, Grapefruit enables us to understand where there are pairing opportunities, product partnerships and “white space” within the category. These foods provide opportunities to develop new products or partner with adjacent industries. Can highlight product new uses and additional recipes.
5. **What They Want** — Consumers offered an incredible array of concepts. 16 total ideas and insights — 7 frozen specific and the remaining 10 could be applied to both fresh or frozen products. Most concepts are low level of complexity and offer NMB and producers additional sku ideas, and concept innovation. Key ideas: larger pieces, pre-spiced, RTE frozen mango salsa, highlight variety and/or ripeness level, and packaging from bulk bags to selling convenience by offering frozen chunks in to-go cup.