



COFFEE QUALITY REPORT

Using Power Bi By
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Introduction

In the world of coffee production, quality is a key focus. The Coffee Quality Institute (CQI), a non-profit organization, is committed to improving the quality and value of coffee on a global scale. They've provided a detailed dataset that includes sensory evaluations, defect counts, processing methods, and information about the origins of coffee beans. This project seeks to use Power BI to explore and analyze this extensive data, uncovering the factors that influence coffee quality and gaining insights to enhance coffee production practices.





Objective

The primary goals of this project are:

1. Identify Key Determinants of Coffee Quality:

- Analyze sensory attributes such as aroma, flavor, acidity, body, and aftertaste to determine their impact on overall coffee quality.

2. Explore Correlations:

- Investigate the relationship between processing methods, origin regions, and coffee quality scores to uncover meaningful patterns.

3. Analyze Defect Trends:

- Identify trends or patterns in defect occurrences and evaluate their influence on overall coffee quality.

4. Examine Variable Interactions:

- Analyze how different variables, including processing techniques and geographic origins, interact to affect the Total Cup Points, providing a comprehensive measure of coffee quality.





Data Overview

The Coffee Quality Data from CQI includes various features such as:

1. Sensory Evaluations (Coffee Quality Scores):

- **Aroma:** Scent or fragrance of the coffee.
- **Flavor:** Taste, including sweetness, bitterness, acidity, and other notes.
- **Aftertaste:** Lingering taste post-consumption.
- **Acidity:** Brightness or liveliness of the taste.
- **Body:** Thickness or viscosity in the mouth.
- **Balance:** Harmony between different flavor components.
- **Uniformity:** Consistency across cups.
- **Clean Cup:** Absence of off-flavors or defects.
- **Sweetness:** Desirable caramel-like, fruity, or floral notes.

2. Total Cup Points: Sum of the sensory attributes, representing overall coffee quality.

3. Defects:

- **Category One Defects:** Primary, visually identifiable defects like black beans, sour beans, and insect damage.
- **Category Two Defects:** Secondary, taste-detectable defects like over-fermentation, staleness, and rancidness.

4. Processing Methods: Includes washed/wet, natural/dry, and pulped natural/honey methods.

5. Origin Information: Data on the country of origin and region, harvest year, and coffee variety.

6. Altitude: Elevation at which the coffee was grown.

7. Moisture: Moisture content in the coffee beans.





Data Preprocessing

- Replace blanks values with nulls
- Country of Origin: Renamed to "Country."
- Altitude: To get one value of Altitude we split the column into two columns by use of Delimiter and then used these two columns to create a new column by calculating the average.
- Number of Bags: Cleared and formatted.
- Region : Translated Chinese to English
- Bag Weight: Extracted weight in kg and converted to whole numbers.
- Grading Date : Replaced st, th,rd, nd with space, Augu to August & change type to Date.
- Color : Replaced the text corrections.
- Expiration : Replaced corrections & change type to Date.
- Remaining all the columns are clear with no errors



New Features

Created 5 Calculated Columns using DAX

- **Total Production:** Multiply the number of bags by the weight of each bag to get the total production volume.
- **Total Category Defects:** Sum the values from Category 1 and Category 2 defects to calculate the total number of defects.
- **Altitude Range:** Convert altitude values into ranges: 0-500, 500-1000, 1000-1500, 1500-2000, and above 2000 feet.
- **Moisture Range:** Classify moisture content into different ranges: 8-9%, 9-10%, 10-11%, 11-12%, 12-13%, and above 13%.
- **Coffee Category:** Categorize coffee based on total cup points: 90-100 is "Outstanding (specialty)," 85-89.99 is "Excellent (specialty)," 80-84.99 is "Very Good (specialty)," and below 80 is "Below Specialty Quality."





Power BI Desktop Report Visuals



Coffee Quality Report



Harvest Year

All

Country

All

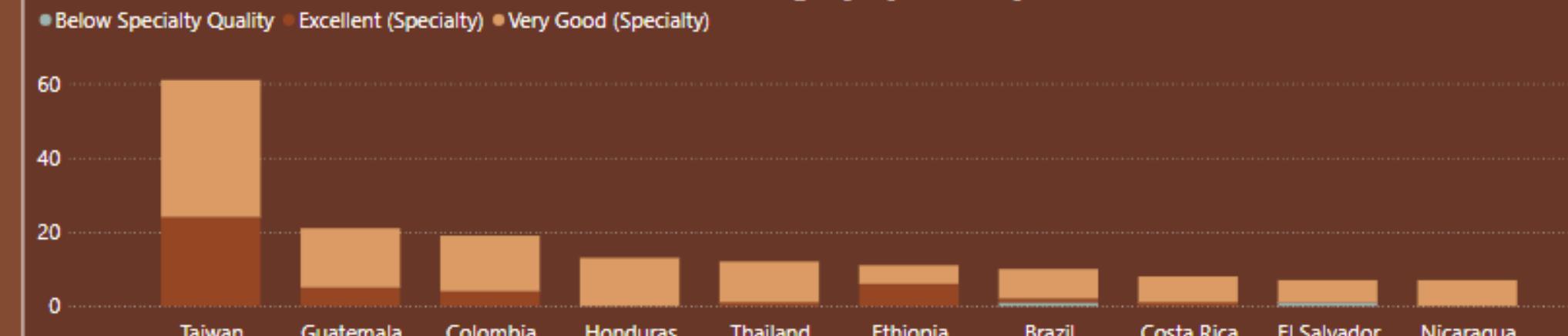
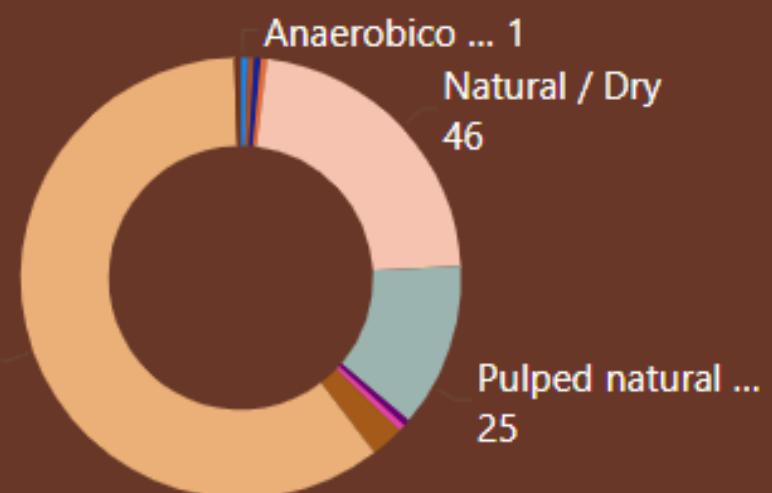
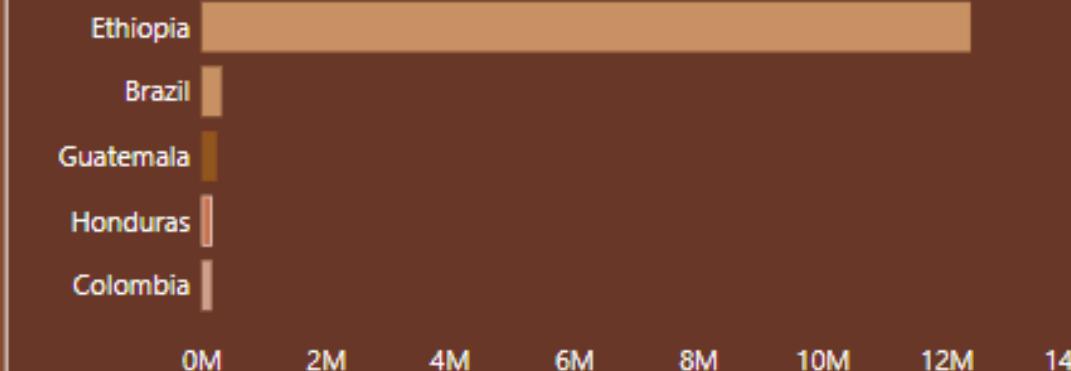
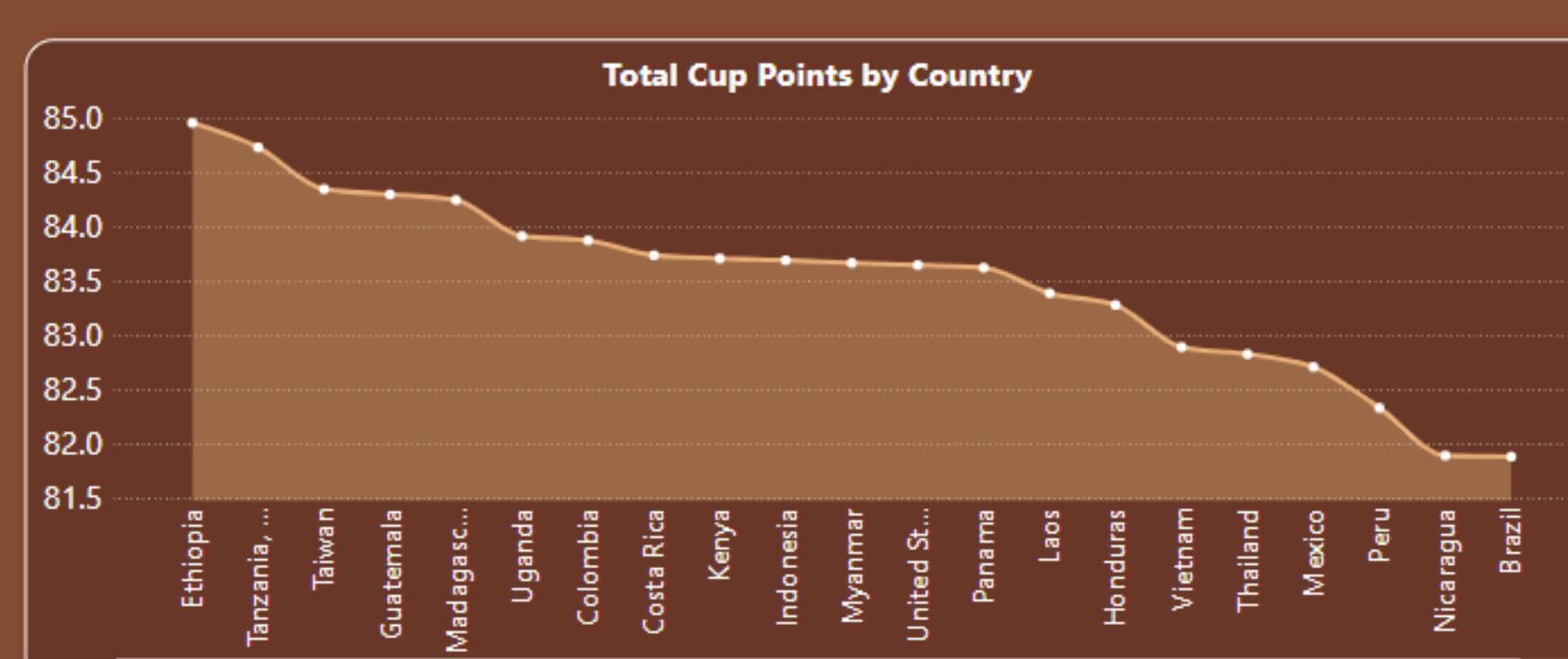
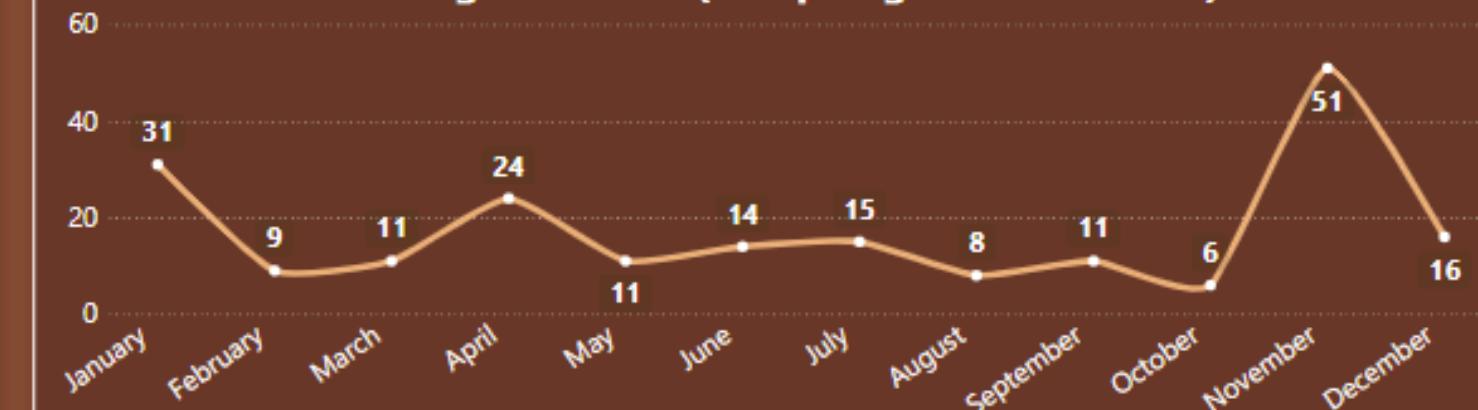


Total Quality Score
83.71

Total Production(kg)
14M

Total Cat.1 Defects
28

Total Cat.2 Defects
466

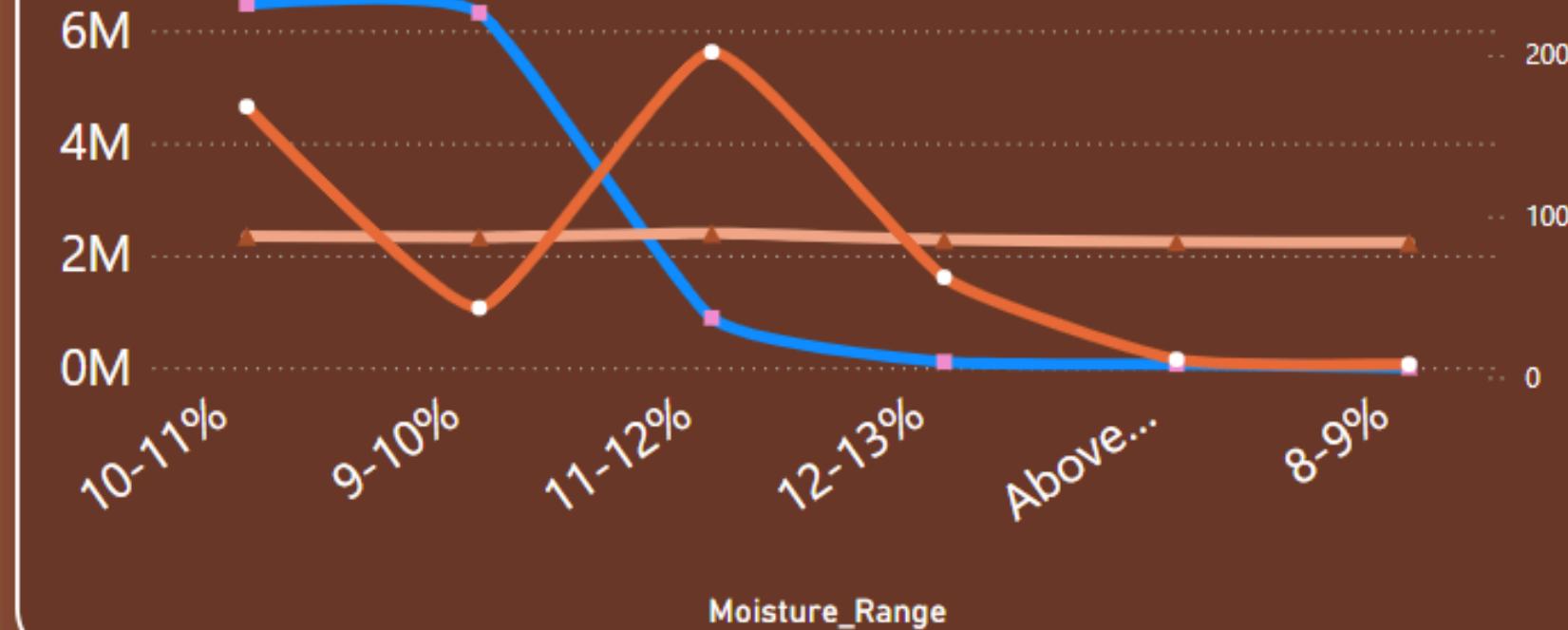

Coffee Category by Country

Processing Method Count

Total Production(kg) by Country

Total Cup Points by Country

Grading Date Trend(samples graded over time)




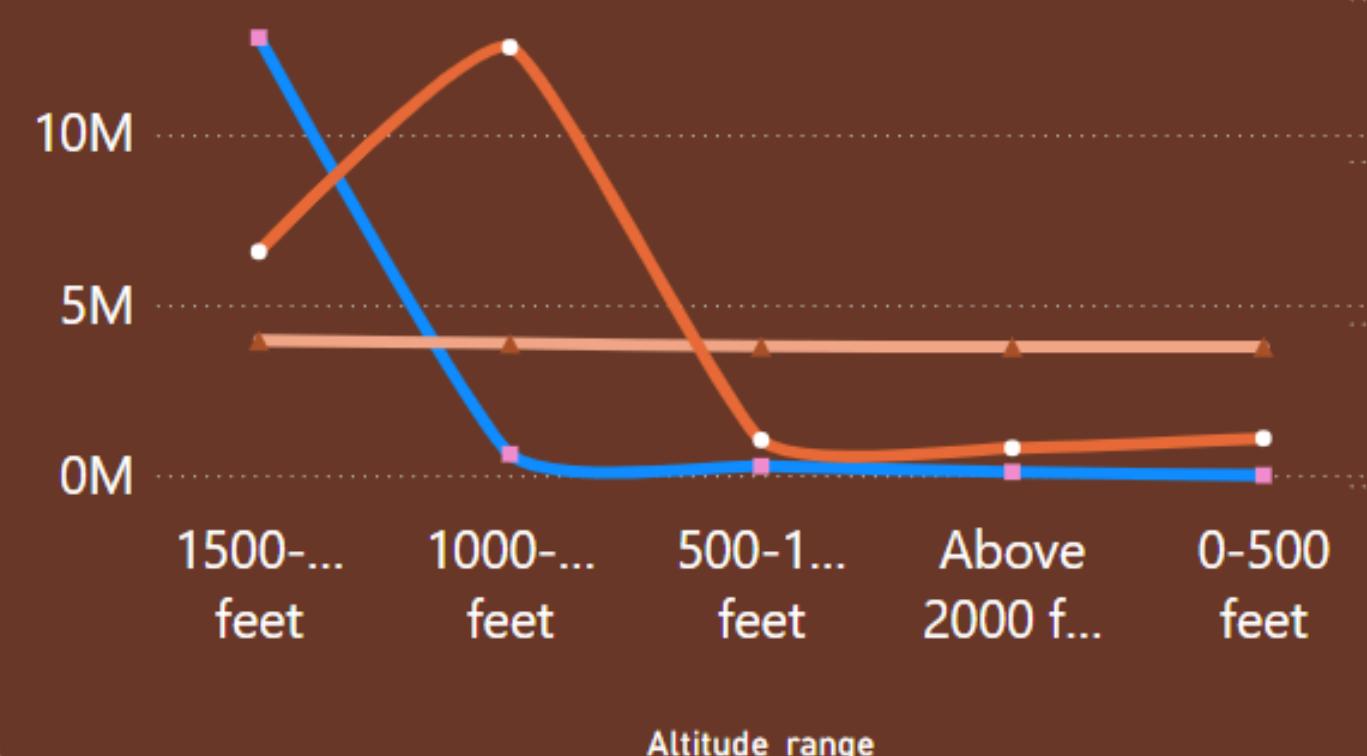
● Sum of Category One Defects ● Sum of Category Two Defects



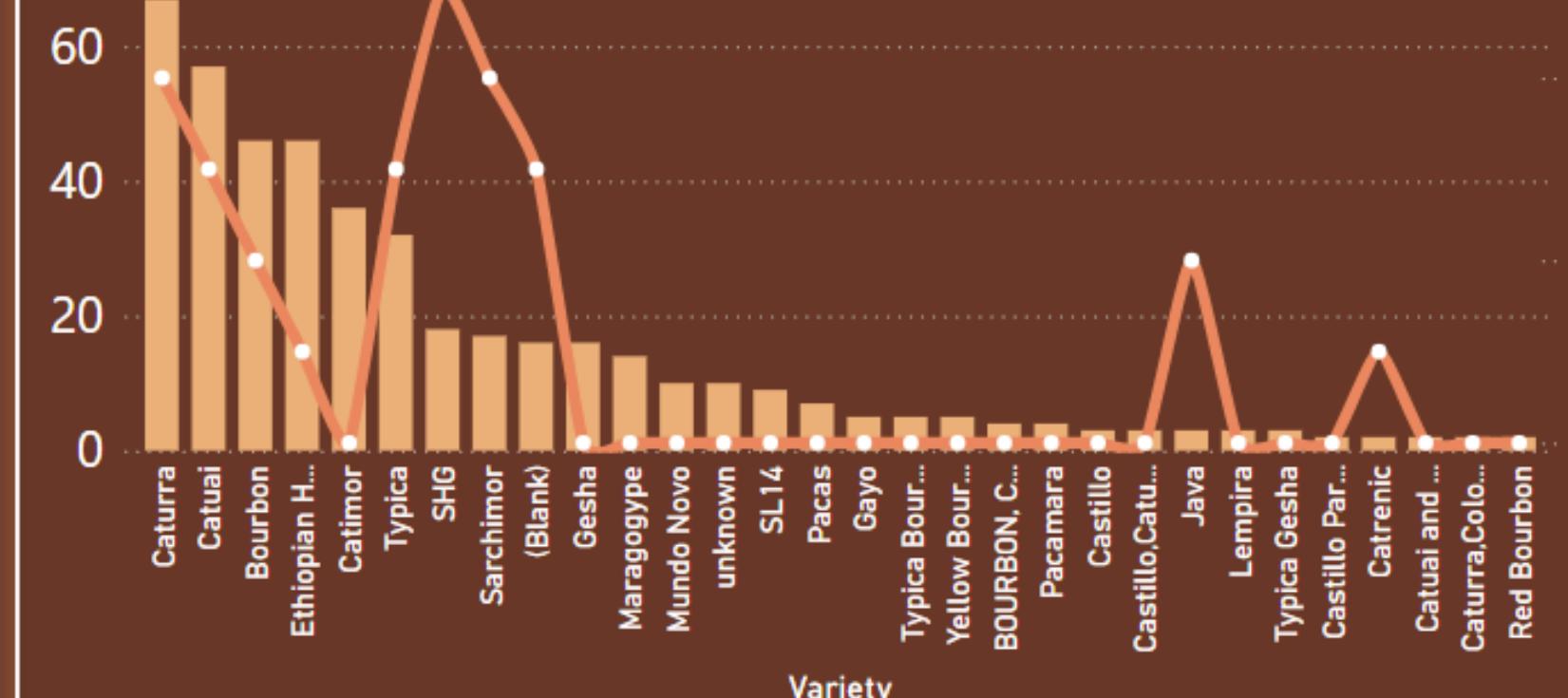
■ Sum of Total Production(kg) ▲ Max of Total Cup Points ● Sum of TotalCategory Defects



■ Sum of Total Production(kg) ▲ Max of Total Cup Points ● Sum of TotalCategory Defects

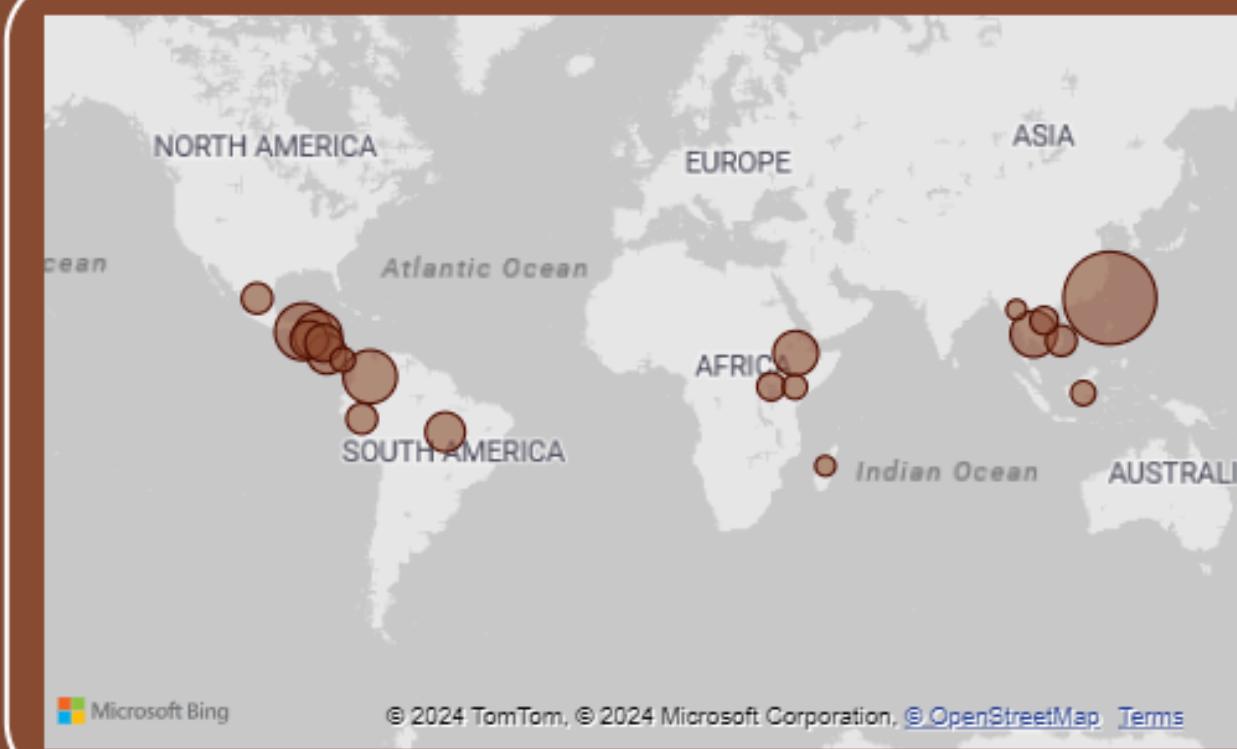


● Sum of Category Two Defects ● Sum of Category One Defects





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Country

All

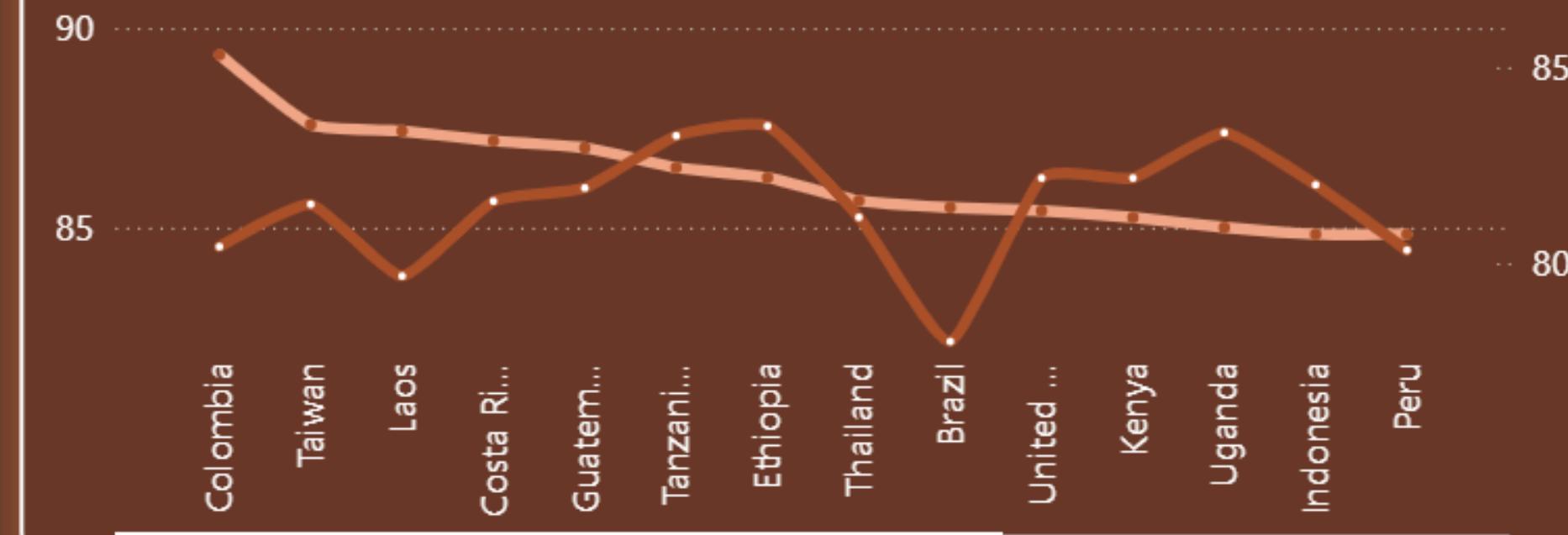
Harvest Year

All

Coffee Variety Distribution By Country

| Taiwan | Guatemala | Thailand | Costa Rica | El Salvador | Nicaragua |
|----------|-----------|-----------------|------------|-------------|-----------|
| 20 | 12 | 8 | 7 | 7 | |
| Colombia | Ethiopia | Tanzania, Un... | Peru | Vietn... | Laos |
| 17 | 11 | 6 | 4 | 4 | 3 |
| Honduras | Brazil | United State... | Uganda | Ke... | Pa... |
| 13 | 8 | 5 | 3 | 2 | 2 |
| | | Mexico | Indone... | Ma... | My... |
| 61 | | | | | |

● Max of Total Cup Points ● Min of Total Cup Points





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20

Anniversary

COFFEE QUALITY
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Country

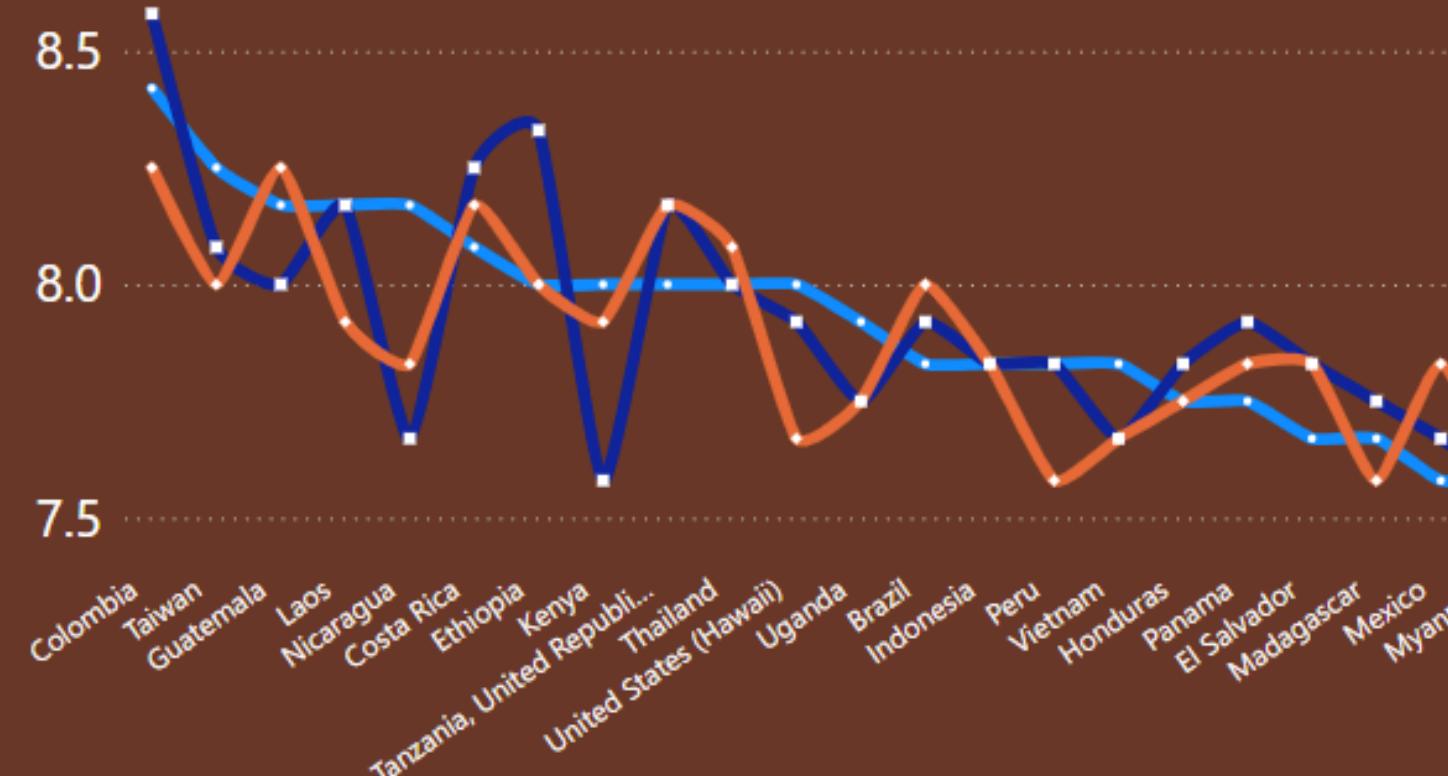
All

Harvest Year

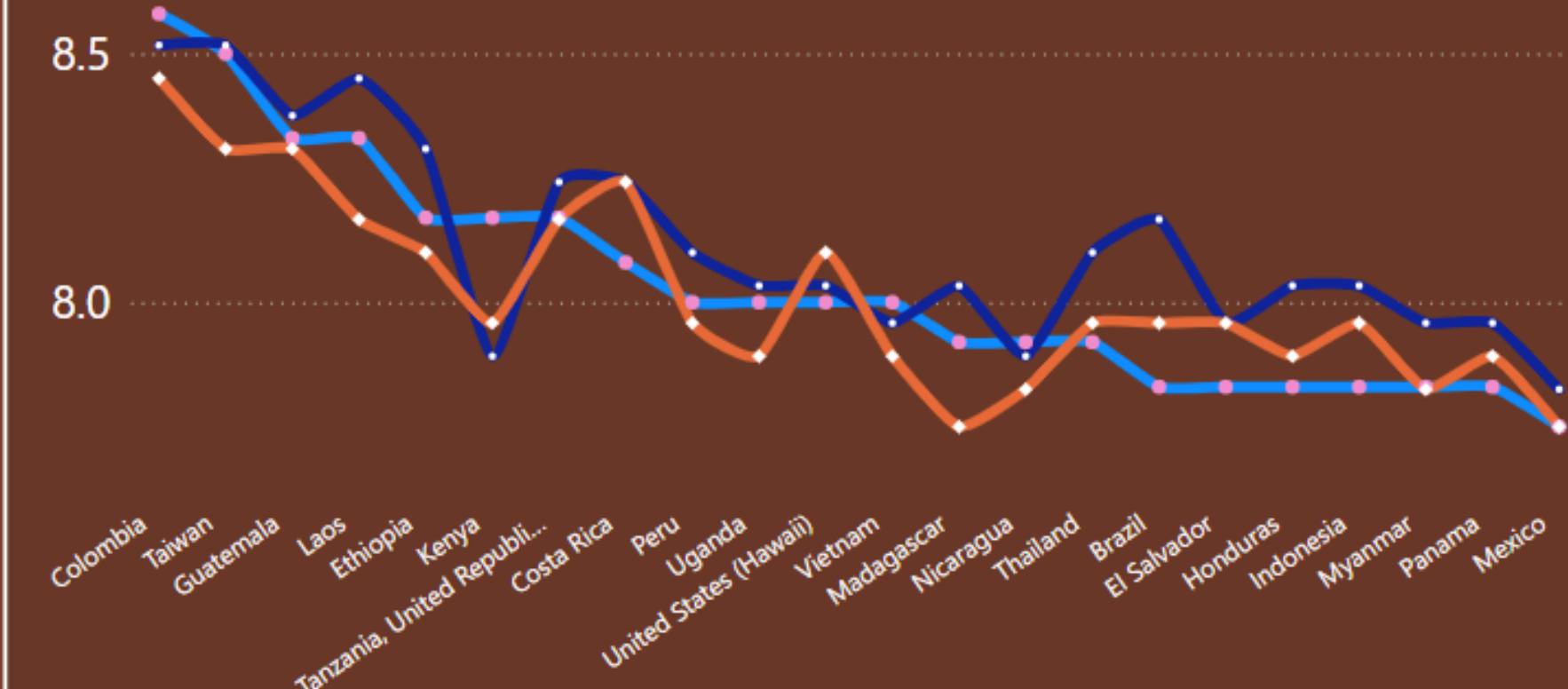
All

| Processing Method | Total Cup Points | Aftertaste | Aroma | Balance | Body | Flavor | Acidity | Total Cat. Defects | Quakers | Max(Total Cup Points) | Count |
|--------------------------------------|------------------|------------|-------|---------|------|--------|---------|--------------------|---------|-----------------------|-------|
| Anaerobico 1000h | 83.25 | 7.58 | 7.67 | 7.58 | 7.58 | 7.67 | 7.67 | 2 | 0 | 83.25 | 1 |
| Double Anaerobic Washed | 89.33 | 8.42 | 8.58 | 8.42 | 8.25 | 8.50 | 8.58 | 3 | 0 | 89.33 | 1 |
| Double Carbonic Maceration / Natural | 84.75 | 7.75 | 7.83 | 7.83 | 7.67 | 7.92 | 7.92 | 5 | 1 | 84.75 | 1 |
| Honey,Mossto | 87.08 | 8.08 | 8.33 | 7.92 | 7.92 | 8.33 | 8.25 | 2 | 2 | 87.08 | 1 |
| Natural / Dry | 83.70 | 7.61 | 7.73 | 7.64 | 7.64 | 7.74 | 7.68 | 102 | 56 | 86.75 | 46 |
| Pulped natural / honey | 83.55 | 7.61 | 7.67 | 7.61 | 7.62 | 7.73 | 7.68 | 31 | 0 | 86.08 | 25 |
| Semi Washed | 87.42 | 8.08 | 8.33 | 8.17 | 7.92 | 8.42 | 8.17 | 2 | 0 | 87.42 | 1 |
| SEMI-LAVADO | 78.00 | 6.67 | 7.25 | 6.67 | 6.83 | 7.08 | 6.83 | 1 | 0 | 78.00 | 1 |
| unknown | 84.42 | 7.68 | 7.87 | 7.73 | 7.65 | 7.83 | 7.87 | 14 | 3 | 85.67 | 5 |
| Washed / Wet | 83.65 | 7.58 | 7.71 | 7.64 | 7.64 | 7.73 | 7.68 | 331 | 80 | 87.58 | 124 |
| Wet Hulling | 84.25 | 7.83 | 7.67 | 7.75 | 7.67 | 7.67 | 7.83 | 1 | 1 | 84.25 | 1 |

● Max of Balance ■ Max of Acidity ♦ Max of Body



● Max of Aroma ■ Max of Flavor ♦ Max of Aftertaste





Country

All

Harvest Year

All

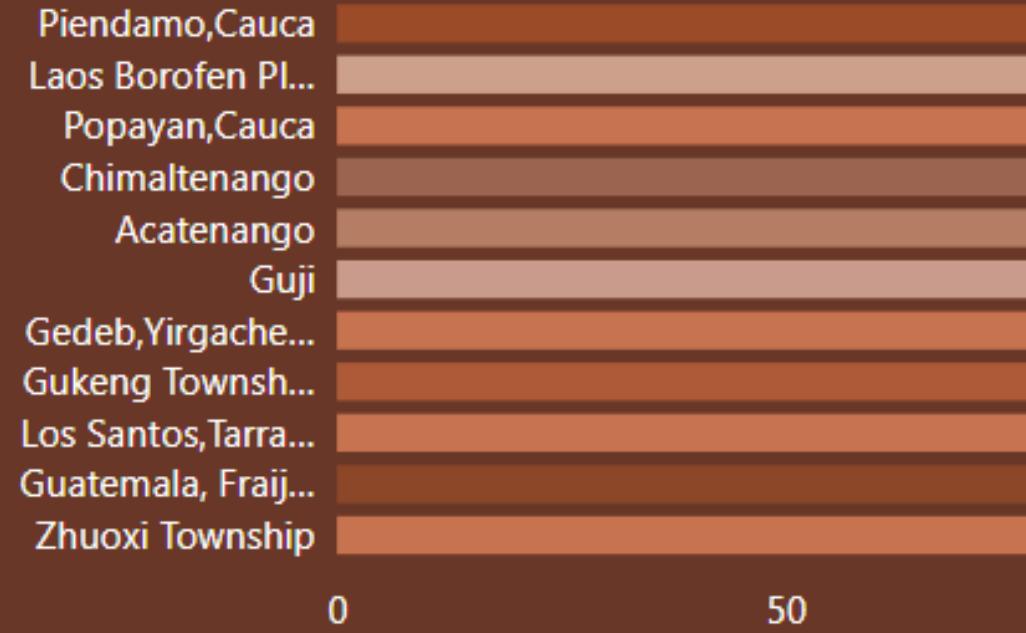


Total Production(kg) by Variety

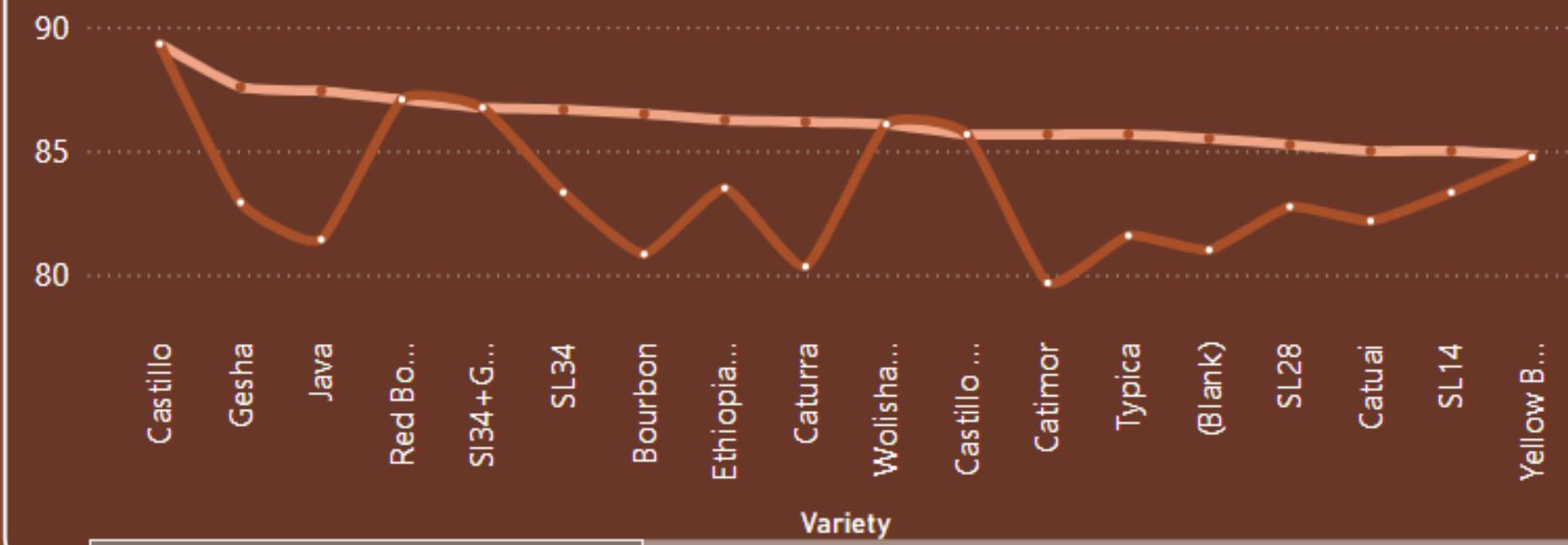


| Color | Max(Total Cup Points) | TotalCategory Defects | Total Production(kg) | Total Cup Points |
|----------------|-----------------------|-----------------------|----------------------|------------------|
| blue-green | 87.58 | 7 | 19846 | 83.85 |
| bluish-green | 85.58 | 42 | 139213 | 83.15 |
| brownish-green | 85.67 | 5 | 2 | 85.67 |
| brownish | 86.25 | 17 | 2326 | 84.78 |
| green | 89.33 | 276 | 1024912 | 83.69 |
| greenish | 86.67 | 81 | 12566237 | 83.47 |
| pale yellow | 85.08 | 10 | 3705 | 83.25 |
| yellow-green | 87.08 | 46 | 82537 | 84.16 |
| yellowish | 87.42 | 10 | 820 | 84.61 |

Total Cup Points by Region



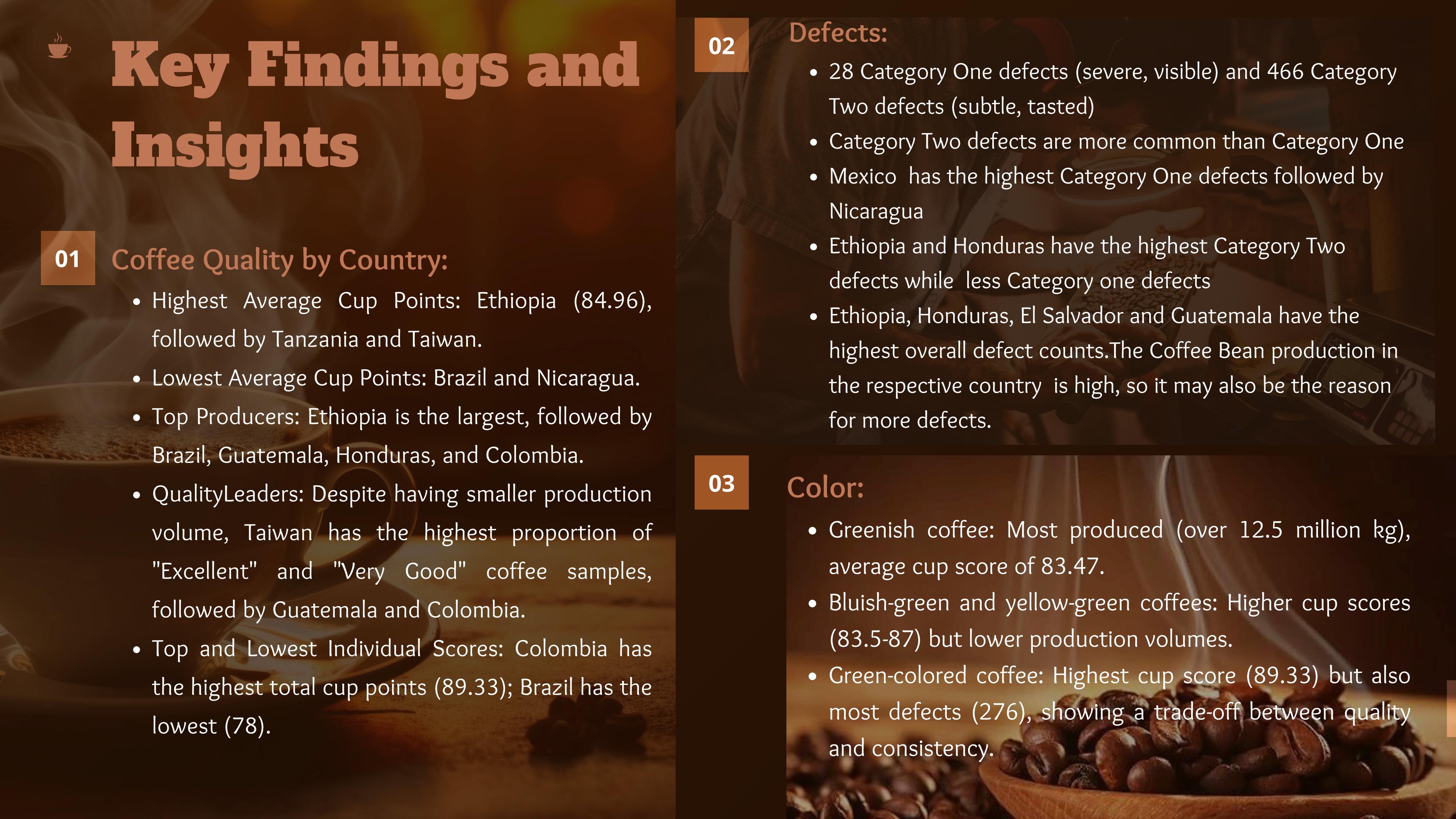
Max of Total Cup Points Min of Total Cup Points





| | Total Cup Points | Acidity | Aroma | Coffee Production | Category One defects | Category Two defects | Flavor | Cup Points | Body |
|---------|---|--|------------------|---|----------------------------|--------------------------------|---|------------------------------------|------|
| Country | Strongly Related – Ethopia has Highest Cup points. El Selvadoe has least. | Strongly Related | Strongly Related | Ethopia is the highest Production in coffee | Mexico has highest defects | Ethopia & handurus are highest | Madagascar has good flavor. ElSalvadoe has less flavored. | Ethopia has highest Cup Points | |
| Color | Color slightly impacts Cup Points | Impacts. Brownish-green has high acidic nature | No Impact | Greenish coffee beans are much produced. | Greenish are much damaged | | Brownish-green good flavoured | Brownish-green has high cup points | |

| Variety | Castillo has good cup points, Maragogype has less | Castillo has high acidic nature | Castillo has good Aroma | Eitheiopian Heirlooms is the high productive coffee | SHG has high defects | Sharchimor has high defects | Castillo has good Flavor | Castillo has good cup points, | Castillo has good body |
|-------------------|---|--|--|---|----------------------------|-----------------------------|--|------------------------------------|--|
| Moisture | | b/n moisture 8-10, good acidity | b/n moisture 9-12.3, good Aroma | | Defects b/n 10-12 Moisture | High b/n Moisture 10-12 | b/n moisture 9-10.9, good flavour | b/n moisture 9-12, good Cup points | |
| Processing Method | | Double Anaerobic Washed has high acidity | Double Anaerobic Washed has good aroma | | Washed/wet has high damage | Washed/wet has high damage | Double Anaerobic Washed has good flavour | Double Anaerobic Washed is good | Double Anaerobic, Honey, Mostto, Semi washed has good Body |



Key Findings and Insights

01

Coffee Quality by Country:

- Highest Average Cup Points: Ethiopia (84.96), followed by Tanzania and Taiwan.
- Lowest Average Cup Points: Brazil and Nicaragua.
- Top Producers: Ethiopia is the largest, followed by Brazil, Guatemala, Honduras, and Colombia.
- Quality Leaders: Despite having smaller production volume, Taiwan has the highest proportion of "Excellent" and "Very Good" coffee samples, followed by Guatemala and Colombia.
- Top and Lowest Individual Scores: Colombia has the highest total cup points (89.33); Brazil has the lowest (78).

02

Defects:

- 28 Category One defects (severe, visible) and 466 Category Two defects (subtle, tasted)
- Category Two defects are more common than Category One
- Mexico has the highest Category One defects followed by Nicaragua
- Ethiopia and Honduras have the highest Category Two defects while less Category one defects
- Ethiopia, Honduras, El Salvador and Guatemala have the highest overall defect counts. The Coffee Bean production in the respective country is high, so it may also be the reason for more defects.

03

Color:

- Greenish coffee: Most produced (over 12.5 million kg), average cup score of 83.47.
- Bluish-green and yellow-green coffees: Higher cup scores (83.5-87) but lower production volumes.
- Green-colored coffee: Highest cup score (89.33) but also most defects (276), showing a trade-off between quality and consistency.

4

Processing Methods :

- The “Double Anaerobic Washed” and “Honey, Mossto” processing methods consistently produce high-quality coffee, as evidenced by their high scores across all sensory attributes. These methods should be explored further and potentially adopted in other regions to enhance coffee quality.

Washed Honey Natural

Understanding the geographical preferences for processing methods helps in identifying regional specialties and potential areas for quality improvement.

- Washed/Wet processed beans has more defects.

5

Coffee Variety:

- Taiwan leads with 61 distinct coffee varieties, followed by Guatemala, Colombia, Honduras, Thailand, and Ethiopia.
- Top-quality beans: Castillo, Red Bourbon, and SL34+Gesha.
- Lowest average cup scores: Mundo Nova and Maragogipe
- Highest production: Ethiopian Heirlooms, followed by Caturra, Mundo Nova, Bourbon, and Catuai.
- Most Category 2 defects: Caturra, then Catuai, Bourbon, and Ethiopian Heirlooms.
- Highest Category 1 defects: SHG variety.

Sensory Attributes:

- Acidity:
 - Max: Colombia, Ethiopia
 - Max Avg: Ethiopia, Tanzania
 - Min Avg: Nicaragua, Brazil
- Aftertaste:
 - Max: Colombia, Guatemala, Taiwan
 - Max Avg: Ethiopia, Tanzania, Taiwan
 - Min Avg: El Salvador, Nicaragua
- Aroma:
 - Max: Colombia, Taiwan
 - Max Avg: Madagascar, Tanzania, Ethiopia
 - Min Avg: El Salvador
- Flavor:
 - Max: Colombia, Taiwan
 - Max Avg: Madagascar, Guatemala
 - Min Avg: El Salvador
- Body:
 - Max: Colombia, Guatemala
 - Max Avg: Tanzania, Ethiopia, Guatemala
 - Min Avg: Peru, Brazil
- Balance:
 - Max: Colombia, Taiwan
 - Max Avg: Tanzania, Ethiopia
 - Min Avg: El Salvador, Brazil

Grading Trend:

- Coffee sample grading shows peak in November(51) followed by January(31) and April(24).
- Beans graded in November, April, and March have more defects.
- November and December see the highest coffee production.
- Seasonal fluctuations in sample grading.
- Aligning production with peak grading periods ensures timely evaluation and market readiness.



8

Region:

- Oramia Region is the largest coffee producer, followed by Sul de Minas.
- Piendamo, Cauca has the highest average cup scores, followed by Loas Borafen Plateau and Popayan Cauca; Minas Gerais has the lowest average cup scores.
- Chiayi has the most coffee varieties, followed by Hsinchu County and Miaoli County.

10

Altitude :

- Coffee from 1500-2000 feet has the highest production, average cup scores, and category defect counts.
- Coffee from 1000-1500 feet has the highest total category defect counts.
- Coffee from above 2000 feet has high average cup scores but lower production.
- Most coffee production is between 500-2000 feet.
- Regions in high Altitude produces Good Quality of Coffee Beans

9

Moisture:

- 9-10% Moisture: High production, excellent average cup scores, and fewer defects compared to higher moisture ranges.
- 10-11% Moisture: Highest production, more defects than 9-10%, but still high average cup scores.
- 11-12% Moisture: Highest defect count.
- 8-9% Moisture: Lowest production.
- 9-11% Moisture: Ideal moisture range for quality.





Questions

Q1 What are the key determinants of coffee quality as evaluated through sensory attributes such as aroma, flavor, acidity, etc.?

- **High Scorers:**

- Colombia, Ethiopia, Guatemala, Madagascar and Taiwan: Consistently excel in attributes like acidity, aroma, body, aftertaste and flavor
- Ethiopia and Tanzania: Often have the highest average scores, particularly in acidity and balance.

- **Sensory Attributes:**

- Aroma: A rich, complex aroma is indicative of high-quality coffee.
- Flavor: The overall taste profile, including sweetness, bitterness, and unique flavors, is crucial.
- Acidity: Adds brightness and vibrancy, a key quality indicator.
- Balance: Harmony among flavor components is essential for high quality.
- Body: Fuller body contributes to a satisfying mouthfeel.
- Aftertaste: A pleasant, lingering aftertaste signifies good quality.

- **Processing Methods:**

- Washed/Wet: Produces cleaner, brighter flavors.
- Natural/Dry: Results in fruitier, more complex flavors.
- Pulp Natural/Honey: Balances sweetness and body.
- Anaerobic and Honey: Less common but create unique, high-quality profiles.

- **Origin Influence:**

- Ethiopia and Tanzania: Known for bright acidity and complex flavors.
- Guatemala and Honduras: Recognized for balance and body, influenced by regional climate, soil, and altitude.



☕ Questions

Q2 Is there a correlation between processing methods, origin regions, and coffee quality scores?

- **Processing Methods:**

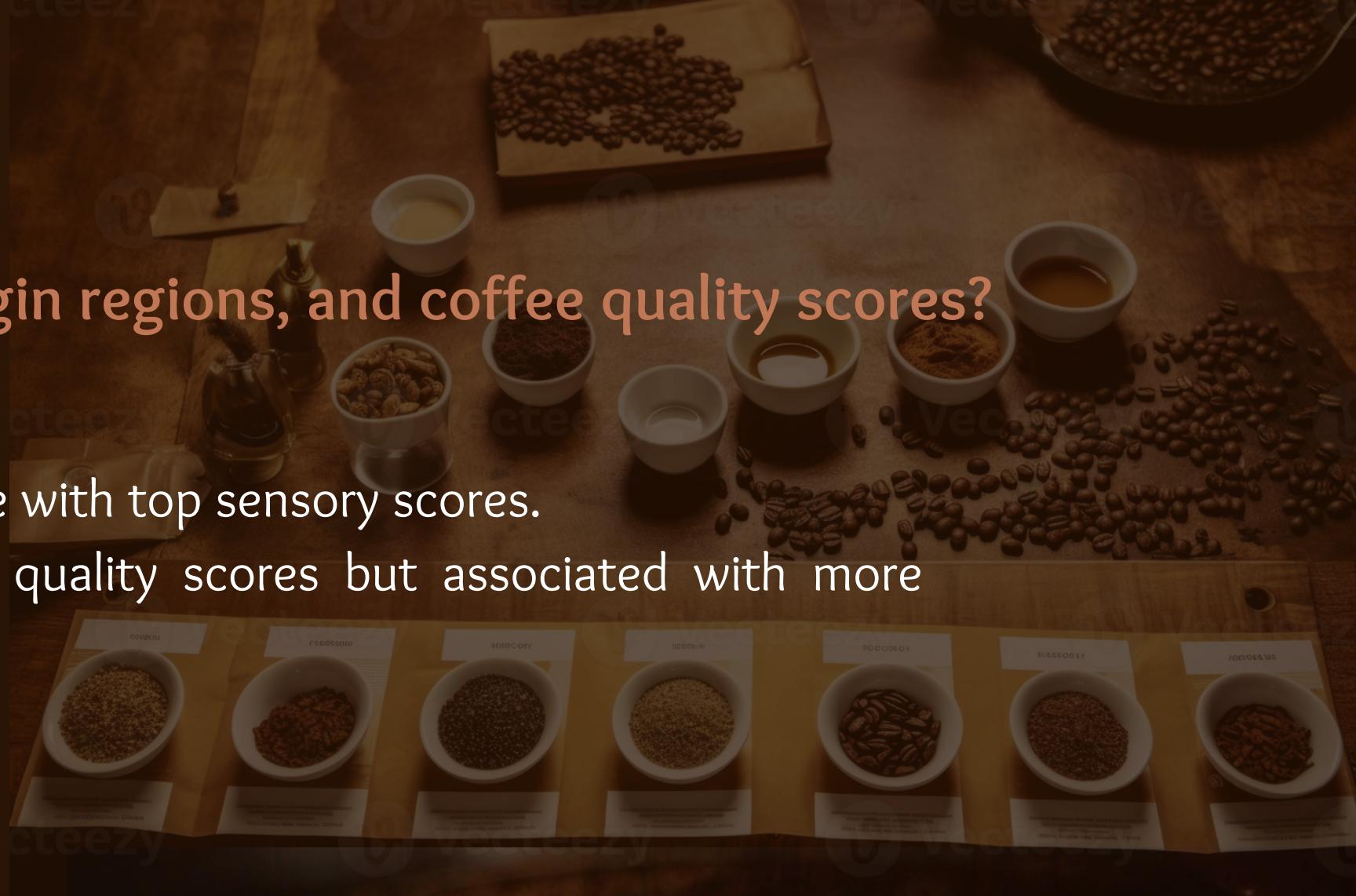
- Double Anaerobic Washed and Honey, Mossto: High-quality coffee with top sensory scores.
- Washed/Wet: Most common (61.39%), often linked to higher quality scores but associated with more defects.
- Natural/Dry: High scores if managed well, especially in Ethiopia.
- Pulp Natural/Honey: Contributes to quality but is less common.

- **Regional Influence:**

- Ethiopia, Taiwan, Colombia, Guatemala, and Honduras: Employ diverse methods and achieve high quality scores.
- Ethiopia and Tanzania: Consistently produce high-quality coffees with elevated scores.
- Guatemala and Honduras: Strong correlation between Washed processing and high quality.

- **Correlation:**

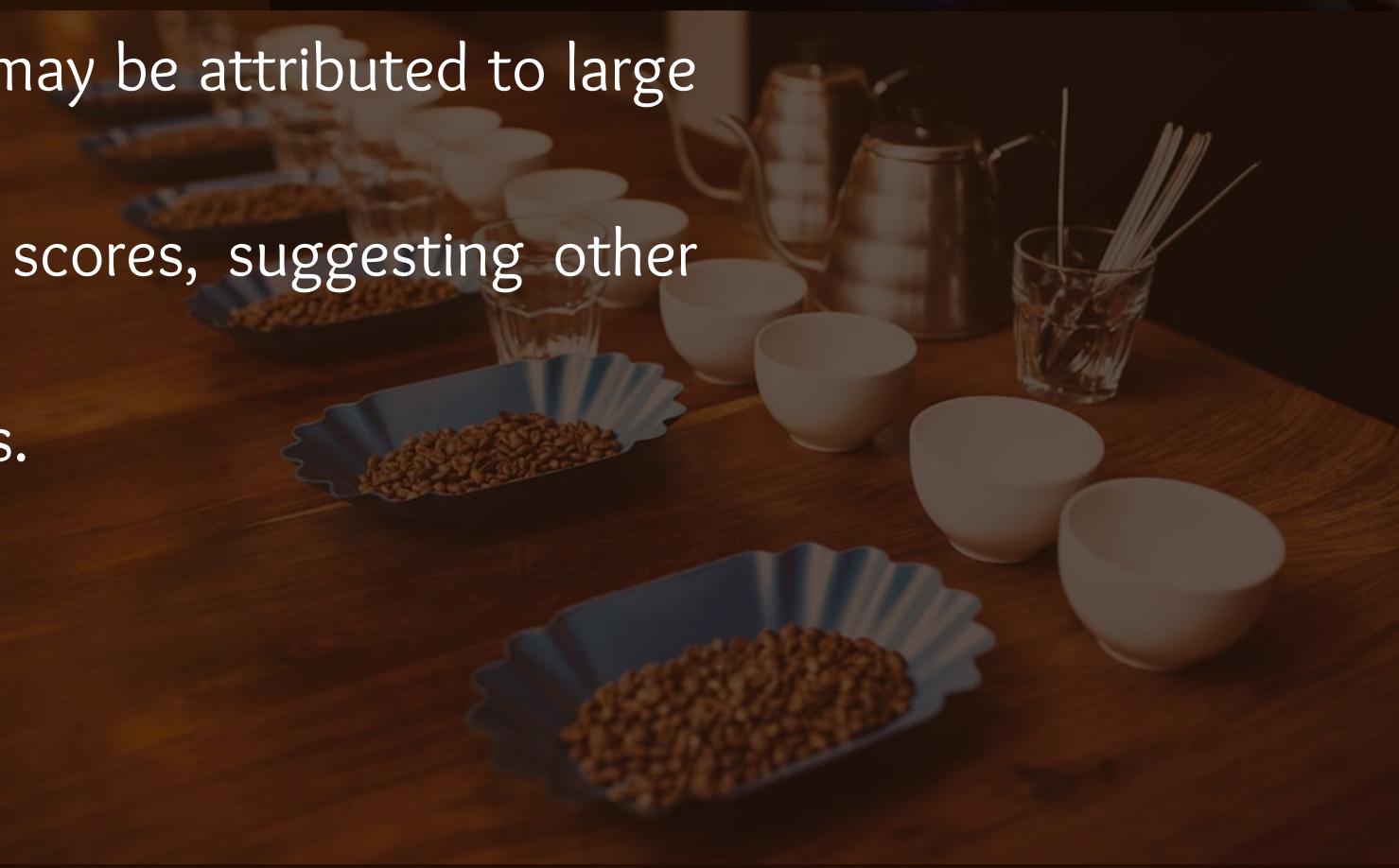
- Positive: Washed/Wet processing often correlates with higher scores due to flavor enhancement.
- Ethiopian Coffees: Naturally processed beans frequently score higher due to unique flavor profiles.
- Guatemalan and Honduran Coffees: Washed method yields high scores for clean and balanced profiles.



Questions

Q3 Can we identify any trends or patterns in defect occurrences and their impact on overall coffee quality?

- Category 2 defects are more common than Category 1 defects and contribute to a subtle decline in quality.
- Washed/wet processed beans have higher category defect counts, affecting overall quality despite being a common processing method.
- Beans graded in November, April, and March show increased defects.
- Beans with a moisture range of 11-12% exhibit the highest defect counts
- Higher defect counts in country like Ethiopia, Honduras and Guatemala may be attributed to large production volumes.
- Despite high defect counts, Ethiopia and Honduras manage high cup scores, suggesting other factors, like altitude and processing, may mitigate defect impact.
- Coffee from 1000-1500 feet has the highest total category defect counts.
- Altitude and moisture levels might be contributing factors to defects.





Questions

Q4 . How do different variables interact to influence the Total Cup Points, which represent an overall measure of coffee quality?

- Moisture Content: An ideal moisture range (9-11%) balances high production, fewer defects, and high cup scores.
- Altitude: Higher altitudes (1500-2000 feet) yield better quality beans with higher cup scores, although with more defects.
- Production Regions: Regions like Ethiopia ,Taiwan, Tanzania and Columbia often produce beans with higher Total Cup Points due to superior processing methods and favorable growing conditions.
- Variety and Processing: High-quality bean varieties (e.g., Castillo, Red Bourbon) and advanced processing methods (e.g., Double Anaerobic Washed and Honey Mossoto) are crucial for achieving high Total Cup Points.



Suggestion for Future Research



01

Optimization of Processing Methods:

Delving into the specific techniques and conditions of successful processing methods, such as "Double Anaerobic Washed," can offer producers clear guidelines for implementing these practices effectively.

02

Strategies for Reducing Defects:

By identifying the underlying causes of defects, targeted interventions can be developed to minimize their occurrence, enhancing the overall quality of coffee.

03

Aligning with Consumer Preferences:

Understanding what consumers value in sensory attributes allows producers to craft products that meet market demands, boosting satisfaction and market share.

04

Promoting Sustainability:

Investigating how sustainable farming practices influence coffee quality can underscore the advantages of environmentally friendly methods, fostering broader adoption.

Thank You

