Blending of Tea (CTC) with Rosella Leaves

Submitted by – Rahul kumar sahu
Submitted to – Dr siddharth singha

Practical Report: Blending of Tea with Rosella Leaves and Sensory Analysis

Background

CTC (Crush, Tear, Curl) tea is a widely consumed form of black tea known for its strong flavour, deep colour, and quick brewing characteristics. It is commonly used in tea bags and mass-market blends due to its cost-effectiveness and bold taste profile. However, in recent years, there has been a growing consumer demand for teas that not only offer traditional flavour but also provide added health benefits and novel sensory experiences.

Rosella (Hibiscus sabdariffa), a tropical plant commonly used in herbal infusions, is recognized for its vibrant red colour, tangy taste, and rich nutritional profile. It contains natural antioxidants, particularly anthocyanins and organic acids, which have been associated with various health benefits, including blood pressure regulation and cardiovascular support.

Blending CTC tea with rosella presents an innovative opportunity to enhance the flavour, colour, and health appeal of conventional black tea. The fusion introduces fruity, floral, and tart notes that can complement the robustness of CTC tea, making it more attractive to a broader, especially health-conscious, market. Furthermore, the addition of rosella can alter the tea's acidity and sensory perception, factors that are crucial in determining consumer preference and product acceptability.

This background sets the stage for investigating how varying levels of rosella infusion influence the sensory, physicochemical, and functional properties of CTC tea blends, with an aim toward optimizing a formulation suitable for both enjoyment and health promotion.

Objective

To study the effects of blending rosella (Hibiscus sabdariffa) leaves with CTC tea at various infusion rates (0%, 5%, 10%, 15%, 20%) and observe changes in physical characteristics, color, aroma, taste, and overall acceptability.

Materials Required
CTC (Crush-Tear-Curl) Tea
Dried Rosella Leaves
Weighing Balance
Teapots or Infusion Jars
Filter or Tea Strainer
Timer
pH Meter
Hot Air Oven
Hot Water (90–95°C)
Sensory Evaluation Sheet
Tea-Rosella Blend Ratios

Infusion Rate (%)	CTC Tea (gm)	Rosella Leaves (gm)
0	2.00	0.00
5	1.90	0.10
10	1.80	0.20
15	1.70	0.30
20	1.60	0.40

*Note: Total blend weight kept constant at 2 gm for uniformity in infusion.
Methodology

Weighing: Measured 2 gm of tea blend for each infusion level according to the table.
Brewing: Added the blend to 100 ml of hot water (90–95°C).
Steeping Time: Infused for 5 minutes.
Filtering: Strained and collected the liquor.
Observation and Evaluation:
- Color
- Aroma
- Taste
- Astringency
- Overall acceptability (sensory panel of 6 members)
- pH and Total Solid

pH Measurement:

Measured the pH of each tea infusion sample immediately after filtering using a digital pH meter. The pH meter was calibrated with standard buffer solutions before use.

Total Solids Determination:

An aliquot (25 ml) of each infusion was evaporated in a pre-weighed dish in a drying oven at 105°C until constant weight was achieved. The increase in weight indicated the total dissolved solids in the tea infusion.

Observations

Infusion Rate (%)	Liquor Color	Aroma	Taste	Astringency	Remarks
0	Dark reddish-brown	Strong, classic CTC	Brisk, strong	High	Typical black tea taste
5	Reddish brown	Mild rosella notes	Slightly tangy, balanced	Moderate	Balanced flavor
10	Ruby red-brown	Fruity-floral	Noticeably tangy, refreshing	Moderate	Pleasant herbal-fruit flavor
15	Bright red-brown	Dominant rosella aroma	Tart, fruity	Low	Good for iced tea
20	Deep ruby red	Strong rosella	Sour, slightly overpowering	Very Low	May suit hibiscus tea lovers

Sensory Evaluation Summary (Average Scores out of 10)

Sensory Analysis Table– 0% Rosella leaves+100% CTC

Panelist No.	Taste	Flavor	Mouthfeel	Aftertaste	Overall Acceptability
1	9	8	7	6	7
2	8	9	7	7	8
3	5	5	5	6	6
4	9	9	9	9	9
5	7	7	6	6	6
6	6	6	5	5	5

Sensory Analysis Table– 5% Rosella+95% CT

Panelist No.	Taste	Flavor	Mouthfeel	Aftertaste	Overall Acceptability
1	6	6	6	6	6
2	7	6	8	7	7
3	7	6	7	7	6
4	8	8	7	7	7
5	8	7	7	6	6
6	7	6	6	5	5

Sensory Analysis Table– 10% Rosella+90% CTC

Panelist No.	Taste	Flavor	Mouthfeel	Aftertaste	Overall Acceptability
1	9	8	9	6	9
2	9	7	7	6	8
3	8	7	7	7	7
4	9	9	8	8	9
5	7	7	7	6	7
6	6	6	5	7	7

Sensory Analysis Table– 15% Rosella +85% CTC

Panelist No.	Taste	Flavor	Mouthfeel	Aftertaste	Overall Acceptability
1	7	7	6	7	7
2	8	9	8	7	8
3	7	6	6	6	6
4	8	6	7	7	6
5	8	7	6	6	6
6	7	7	5	7	7

Sensory Analysis Table– 20% Rosella +80% CTC

Panelist No.	Taste	Flavor	Mouthfeel	Aftertaste	Overall Acceptability
1	7	7	6	6	6
2	7	7	6	6	5
3	9	6	6	8	8
4	7	7	7	6	7
5	8	8	6	5	7
6	6	7	7	6	7

pH Values and Total Solids Content

Infusion Rate (%)	pH Value	Total Solids (g/1ml) Sample 1	Total Solids (g/1ml) Sample 2
0	6.66	0.0821	0.0855
5	5.90	0.0961	0.0956
10	4.87	0.0969	0.0976
15	4.52	0.0992	0.0989
20	4.12	0.1112	0.1103

Total Solid

Sensory Evaluation Summary

The sensory evaluation revealed clear trends in consumer perception across different levels of rosella infusion into CTC black tea:

- 0% Rosella (Pure CTC Black Tea):
  The control sample (0% rosella) was generally well-received, with high scores in taste (average ~7.3), flavour (~7.3), and overall acceptability (~6.8). Some panellists rated it very high (e.g., Panellist 4), while others showed moderate preference, reflecting the typical variability in traditional black tea acceptability.

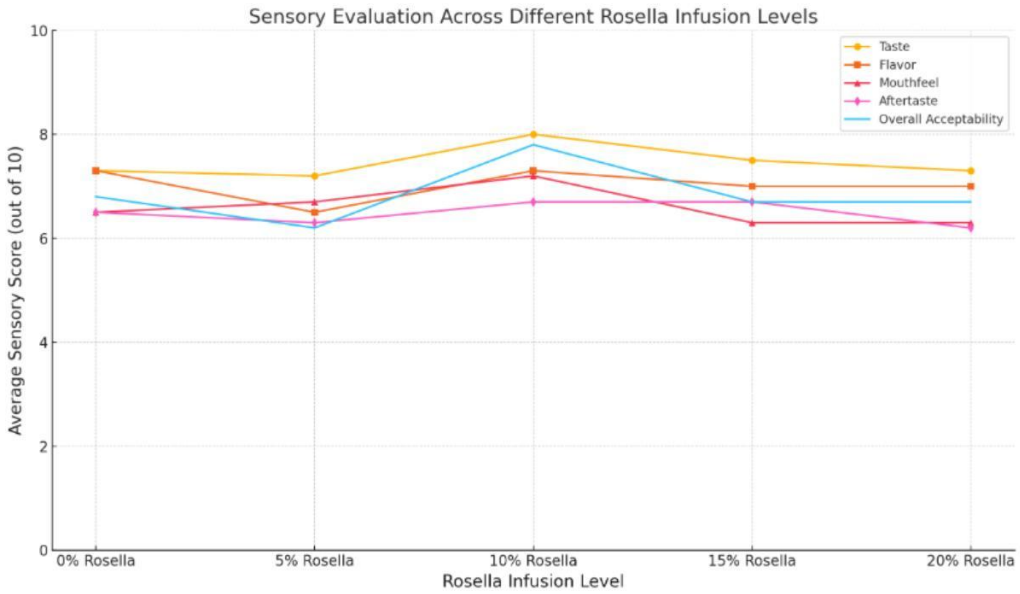
- 5% Rosella + 95% CTC:
  At 5% infusion, scores remained moderate but slightly dipped compared to pure CTC. The overall acceptability averaged around ~6.2. Although flavour and aftertaste remained stable, the addition of rosella seemed to introduce a slight unfamiliarity, lowering the scores slightly.

- 10% Rosella + 90% CTC:
  Infusion at 10% rosella achieved the most balanced and favourable results, with high taste (~8), flavour (~7.3), and overall acceptability (~7.8). Most panellists appreciated the enhanced complexity, flavour brightness, and the softer mouthfeel without overpowering the traditional black tea character. This supports the earlier conclusion that 10–15% rosella is an ideal range.

- 15% Rosella + 85% CTC:
  At 15% infusion, scores remained strong but slightly more variable among panellists. While some appreciated the boldness, others found the tartness slightly

dominant. Overall acceptability averaged around ~6.7, still relatively high but showing the beginning of a preference split.

- 20% Rosella +80% CTC:
  At 20%, the sensory scores plateaued or slightly declined (overall acceptability ~6.7). While certain attributes like mouthfeel and aftertaste were still acceptable, the increased tartness and acidic notes likely made the tea polarizing, suiting niche palates more than a mainstream audience.



Overall Insights:

- Best Infusion Level: 10–15% rosella addition offered the best balance of flavour, mouthfeel, and consumer acceptance.
- Panellist Variability: Individual preferences varied more at higher rosella concentrations, indicating that higher tartness suits a specific market segment.
- Mouthfeel and Aftertaste: Moderate infusion levels (10–15%) optimized mouthfeel and minimized any lingering tartness or dryness.
- Market Strategy Implication: Products targeted at a broader market should prioritize 10–15% infusion levels, while premium or specialty versions could explore 20% for consumers seeking intense Flavors.

Discussion

Blending CTC black tea with rosella (Hibiscus sabdariffa) significantly alters its sensory attributes, introducing distinctive fruity, floral, and tart notes. The results indicate that a 10–15% rosella infusion strikes an optimal balance, enhancing the tea's color, aroma, and taste without overwhelming the core characteristics of black tea. This makes it suitable for a wide range of consumers, particularly those seeking a flavorful yet familiar beverage experience.

At a 20% concentration, rosella's tartness becomes more dominant, aligning with preferences for sour or herbal drinks. However, this level may not appeal to traditional black tea drinkers due to the intensity of the flavour shift. Furthermore, the pH of the blend decreased progressively with higher rosella content, confirming an increase in acidity. This change is consistent with rosella's natural composition and contributes to its tangy flavour profile. It may also influence consumer perception by aligning the product with health-focused trends, as acidic herbal teas are often associated with wellness benefits.

These findings highlight the importance of carefully calibrating rosella content to balance consumer acceptability with potential functional benefits.

Conclusion

This study highlights the promising potential of rosella as a botanical enhancer for CTC black tea, particularly at infusion levels of 10–15%. At these concentrations, the blend achieves a harmonious balance of Flavors, offering a rich, full-bodied taste with subtle floral and tart undertones that complement the robustness of traditional black tea. This infusion level caters to both conventional tea drinkers and health-conscious consumers, ensuring broad market appeal.

While higher concentrations of rosella may create a more intense tartness and deeper colour, these stronger infusions are likely to attract only a niche audience with a preference for bolder, more pronounced Flavors. The study also reveals significant changes in pH levels, which not only influence the sensory characteristics of the tea but may also have functional implications for its health benefits and product stability. These factors should be carefully considered in future product development to optimize both flavour and nutritional value.

Of particular note is rosella's contribution to the visual appeal of the tea, imparting a vibrant reddish hue that enhances the overall sensory experience and distinguishes the product on the market shelf. This striking colour not only signals freshness and natural

ingredients to consumers but also reinforces the perception of healthfulness, a key factor in purchasing decisions. By leveraging rosella's natural colorants, antioxidant properties, and flavour-enhancing qualities, manufacturers can create a differentiated product that aligns with growing consumer demand for authentic, visually appealing, and health-promoting beverages. Strategic marketing and careful formulation will be critical in maximizing the success of rosella-infused CTC black teas in an increasingly competitive tea landscape.