



Summary

- Infusions and syrups made from calyces of *Hibiscus* var. *sabdariffa* are commonly consumed in West African countries, particularly in Senegal, where they are broadly known as *jus de bissap*.
- The sensory quality of a traditional Senegalese hibiscus infusion (CTi) and three new hibiscus drinks developed by the African Food Tradition Revisited by Research (AFTER) project – an ultra-vacuum concentrate (UVc), an improved syrup (REs) and an improved infusion (REi) – was evaluated by a consumer sample (n=150) in Dakar in October and November 2013.
- Mean overall liking ratings show that all new drinks were liked slightly to moderately, as well as better appreciated than the traditional infusion. Derived clusters were highly related to participants' evaluations of sensory attributes, namely of sweet, acid and bissap taste intensities. New drinks were also characterized as traditional, healthy and nutritious.
- Multi-Factorial Analysis (MFA) plot shows a good agreement between Just-About-Right (JAR) ratings and Check-All-That-Apply (CATA) descriptor choices across all samples.

Materials and Methods

- Consumers of hibiscus drinks were non-probabilistically recruited at four Dakar locations, according to their willingness and availability to participate in the study (n=150). Their ages ranged between 18 and 73 years old (average 34); 61% were male, 88% were Senegalese or long-term Senegal residents and 81% consumed hibiscus drinks at least several times/month.
- Tasted samples were prepared from a mixture of dried calyces (50:50 'Koor': 'Vimto' Hibiscus cultivars) grown locally.
- Sample acceptability was assessed by overall liking ratings provided on a 9-point hedonic scale. Hierarchical cluster analysis (Ward's method) was used to segment consumers accordingly. Sensory attributes' – *colour*, *bissap odour*, *bissap*, *sweet* and *acid taste* – intensities, relatively to participants' ideal level, were measured by attribute ratings provided on a 3-point JAR scale. These ratings were related to overall liking using a Weighted Penalty analysis. XLSTAT (Addinsoft) software was used to analyse data.
- Sensory profiles were obtained with CATA questions. These entailed 21 sensory or hedonic-oriented descriptors drawn from two previous focus groups with Senegalese hibiscus drinkers. Seventeen terms discriminated significantly ($p \leq 0.05$) between samples and were subsequently submitted to Correspondence Analysis (CA). Individual discriminant term choices were also related to overall liking by a Penalty-Lift analysis.
- MFA was used to relate sample acceptability, sensory attribute intensity and sensory profiles.



Conclusions

- Overall liking assessment were complemented by attribute intensity evaluations and sensory profiling to provide important insights about hibiscus drinks' perception and acceptability by consumers in Senegal. In spite of their varying sensory characteristics, the new drinks developed by AFTER were all well-liked, also when compared to a traditional local infusion.
- Moreover, the employment of JAR and CATA techniques uncovered important drivers for further sensory optimization of the new hibiscus infusion and syrup.
- Further studies are needed to assess consumer acceptability and sensory profiling of improved hibiscus drinks among consumers who are yet unacquainted with such products. AFTER is currently exploring the market potential of these and other African-tradition based products in Europe, with encouraging results.

Acceptability of improved hibiscus drinks by Senegalese consumers

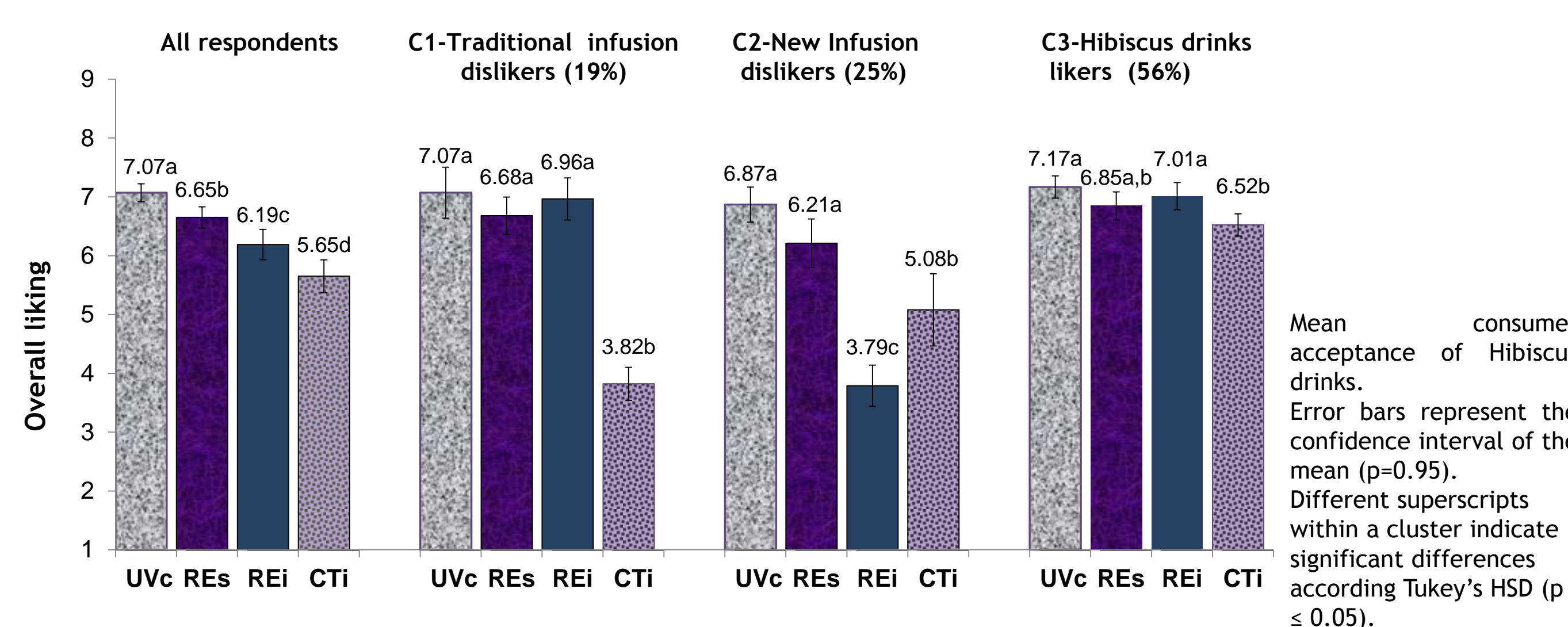
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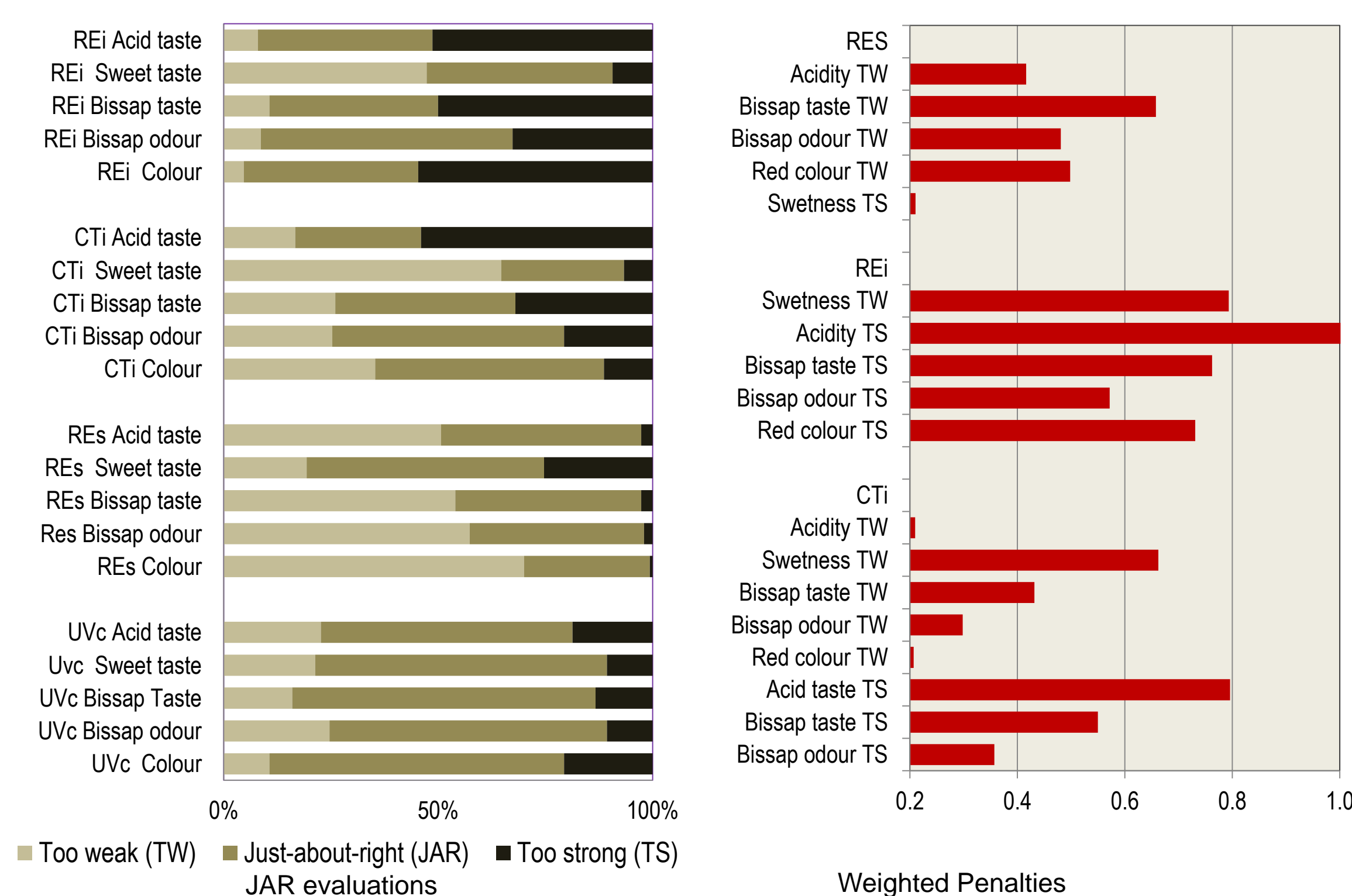
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Results and discussion

- Consumer acceptance was positive for all samples, but differed significantly ($p \leq 0.01$) between them. Mean overall liking ratings show that all new drinks were liked slightly to moderately, as well as better appreciated than the traditional infusion.
- Three clusters of Senegalese consumers were identified based on overall liking ratings: C1 - *Traditional infusion dislikers* (19%), C2 - *Improved infusion dislikers* (25%), C3 - *Overall likers* (56%). Cluster 3 size can be explained by the popularity of hibiscus drinks in Senegal and the effectiveness of the new production processes developed by AFTER.



- Clusters were highly related to participants' evaluations of sensory attributes, namely the sweet, acid and bissap taste intensities of different samples. Significant age and gender effects on JAR ratings were uncovered, indicating a penalty for weaker sweet and stronger acid taste intensities by women and younger participants.



- CATA CA results show that the four hibiscus drinks were perceived to have highly distinct sensory profiles. While the traditional drink was mainly described as *bitter* and *acid*, and the improved infusion as *astringent* and *strong in bissap*, the improved syrup was mostly characterised as *light in bissap*, *diluted* and *syrupy*. UVc, the preferred drink, was thought to have a *balanced taste* and to be *sweet*, *dark red*, *appealing*, *natural* and *refreshing*.
- Hedonic-oriented descriptors' choices were positively related to overall liking ratings. A negative penalty-lift was observed for negative sensory descriptors like bitter, astringent and light in bissap taste.
- The partial representation of samples and centroids in the first two dimensions of the MFA plot shows a good agreement between JAR ratings and CATA descriptor choices across all samples.

