



Consumers' sensory perception and acceptability of Hibiscus drinks: a cross-cultural study in Europe

Appréciation et perception sensorielle des jus d'Hibiscus: une étude inter-culturelle en Europe

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Bissap ou Karkadé



Bissap (Senegal) or *Karkade* (Egypt) is obtained from the flower of Red Sorrel (*Hibiscus sabdariffa* L.). Dry calyx of the flower is used in Senegal and other Western African countries for the preparation of beverages and other products with high anthocyanins content.

<http://www.after-fp7.eu/en/products/plant-based-extracts>

Improved
Bissap drinks

Development



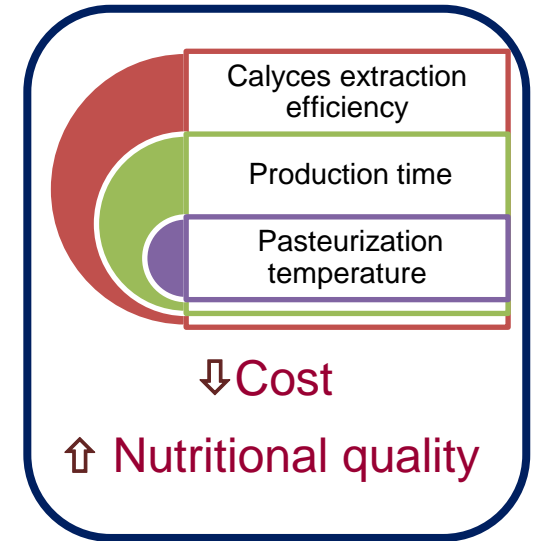
Scale-up



Sensory perception and acceptability

Improved drinks

Ground calyces
50% Koor: 50% Vimto
Extraction ambient
temperature
Filtration 0.45 µm
Pasteurisation at 75 °C



2013



**Sensorial
quality**

2014





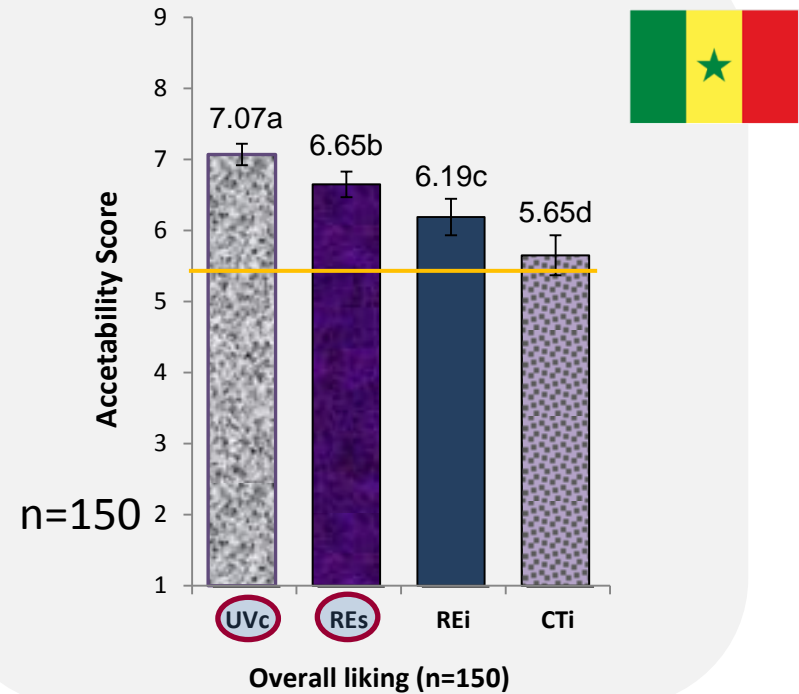
Improved syrup (REs)
Diluted prior to use

Ultra-vacuum concentrate (UVc)
Diluted and sweetened prior to use

Improved infusion (REi)
Ready to drink

Commercial traditional infusion (CTi)
Ready to drink

Sensory perception and acceptability Dakar



Very good results!



Improved syrup (**REs**)
Ultra-vacuum concentrate (**UVc**)
Calyces' infusion freshly prepared (**FTi**)

Overall liking
Attribute intensity appropriateness:
red colour, sweetness and acid taste
Sensory profile

Sensory perception and acceptability Europe

390 consumers

98% European or European residents.

Hibiscus drinks consumption



Never/Do not know Seldom Occasionally Frequently

95% consumed fruit beverages or cold tisanes at least monthly.



Positive for **improved drinks** in all countries.

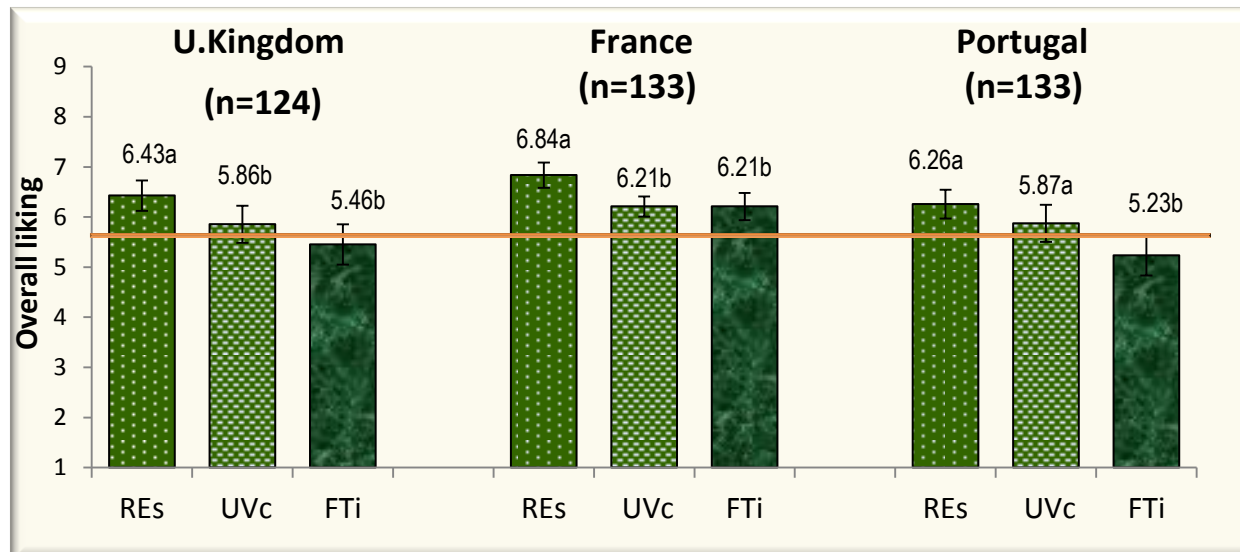
Similar preference profiles observed across countries.

Slightly higher results in France.

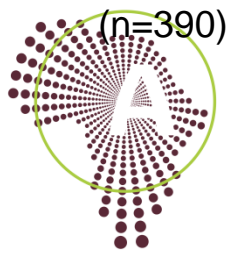
Overall liking

What is your **OVERALL APPRECIATION** of 6Z3 drink?

- Like extremely
- Like very much
- Like moderately
- Like slightly
- Neither like nor dislike
- Dislike slightly
- Dislike moderately
- Dislike very much
- Dislike extremely



Mean likings and CI of the mean ($p=0.95$).
Significant differences: Tukey's HSD ($p \leq 0.05$).



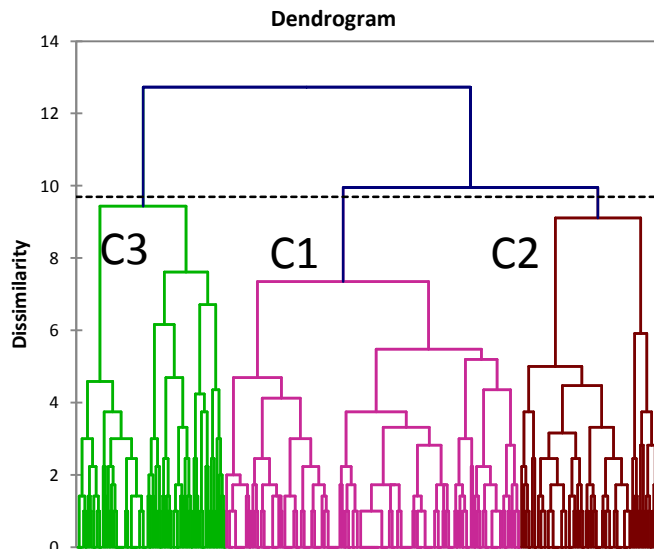
F T E R

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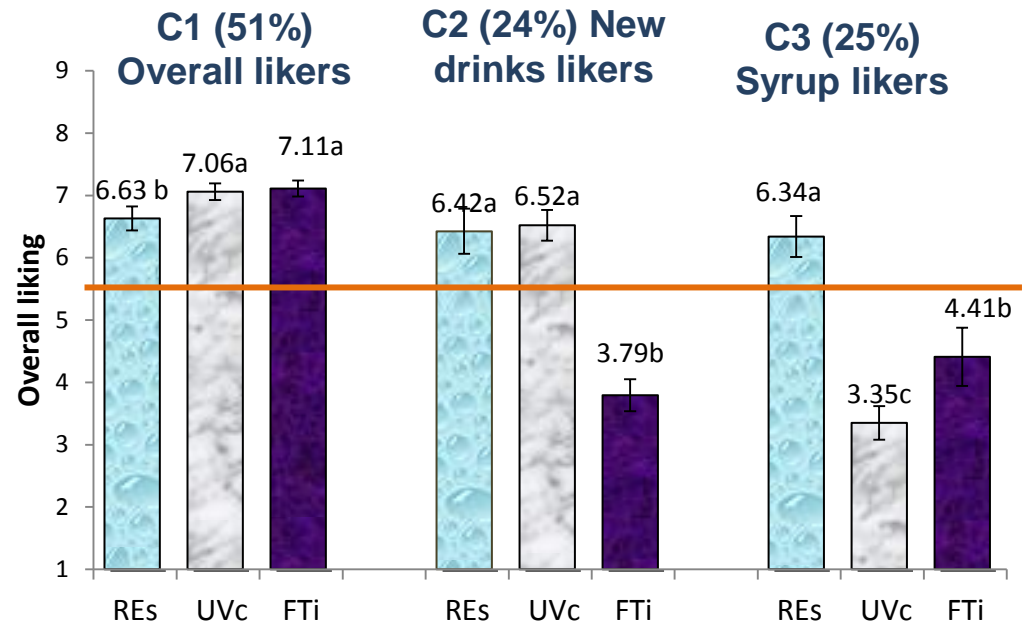
11 & 12 novembre 2014

Cluster analysis

Segmentation according to overall liking pattern (n=390)



Agglomerative Hierarchical clustering
Euclidean distance, complete linkage



No significant differences between clusters related with countries and gender were observed. Significant differences detected for age ($p < 0.01$)

Age - C1: $\bar{X} = 32.2$, C2: $\bar{X} = 32.5$. C3: $\bar{X} = 27.4$

Attribute intensity evaluation using JAR scales

Sensory attribute intensities relatively to participants' ideal level

How do you feel about the COLOUR of 6Z3?

Too weak Just about right Too strong

○ ○ ○

How do you feel about the SWEETNESS of 6Z3?

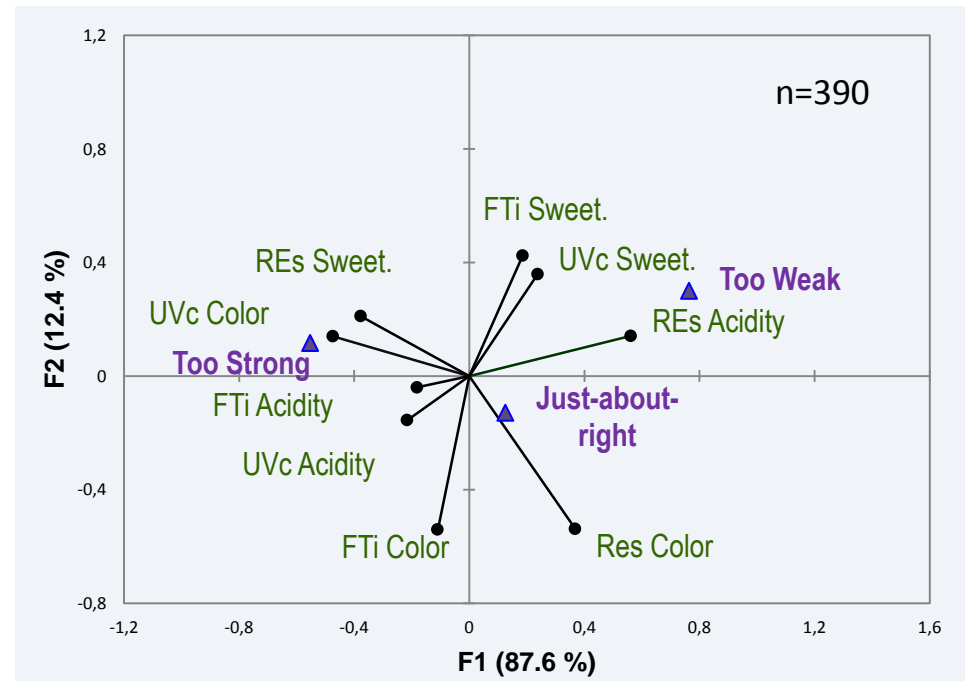
Too weak Just about right Too strong

○ ○ ○

How do you feel about the ACIDITY of 6Z3?

Too weak Just about right Too strong

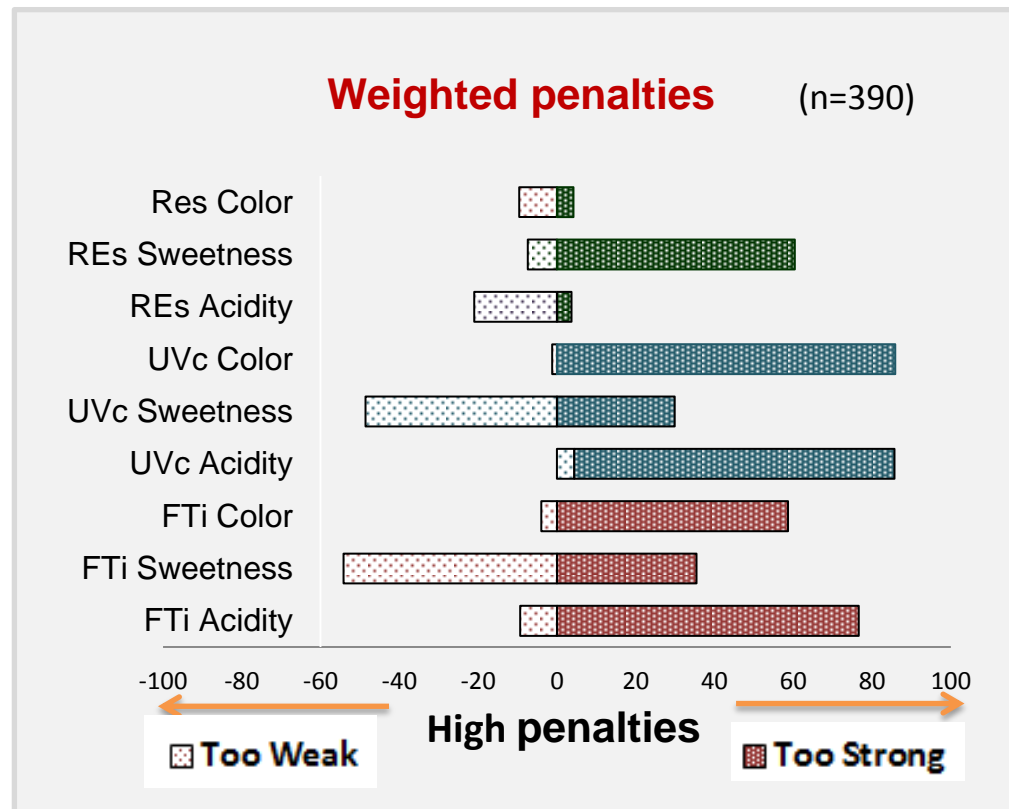
○ ○ ○



Similar results were observed in all countries.

Weighted penalties

JAR rating data & overall liking





F T E R

CONGRÈS

11 & 12 novembre 2014

Consumer sensory profiling Check-all-that apply (CATA)

Please indicate the WORDS BEST DESCRIBING drink 4P8.
(Check all options that apply)

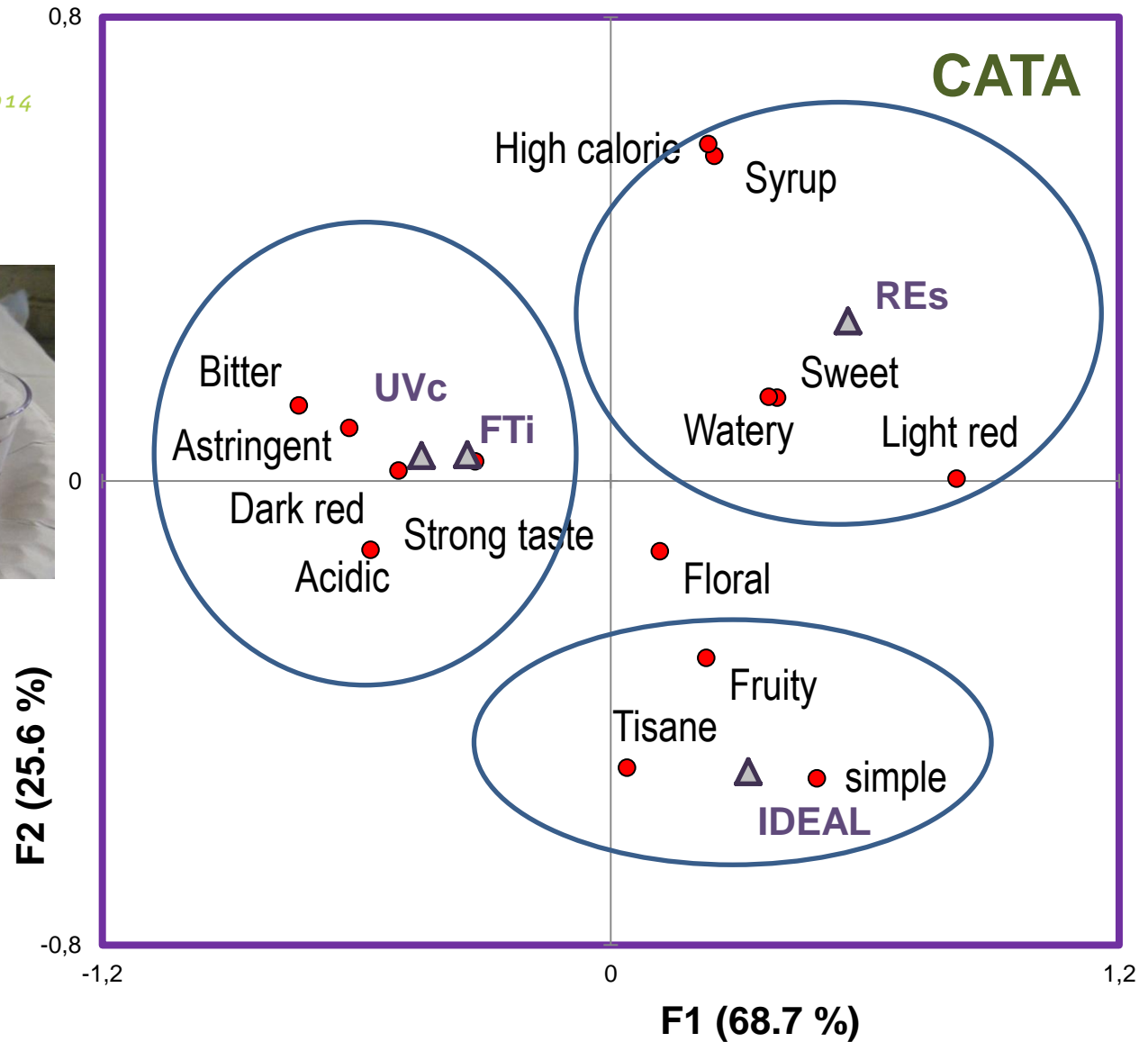
- | | | | |
|---------------------------------------|---------------------------------------|---|---|
| <input type="checkbox"/> Refreshing | <input type="checkbox"/> Light red | <input type="checkbox"/> Artificial | <input type="checkbox"/> Fruity |
| <input type="checkbox"/> Red fruits | <input type="checkbox"/> Syrup | <input type="checkbox"/> Different/ unknown | <input type="checkbox"/> Natural |
| <input type="checkbox"/> Sweet | <input type="checkbox"/> New | <input type="checkbox"/> Bitter | <input type="checkbox"/> Simple |
| <input type="checkbox"/> Dark red | <input type="checkbox"/> Tisane | <input type="checkbox"/> Astringent | <input type="checkbox"/> Balanced flavour |
| <input type="checkbox"/> Invigorating | <input type="checkbox"/> Watery | <input type="checkbox"/> Antioxidant | <input type="checkbox"/> Strong taste |
| <input type="checkbox"/> Floral | <input type="checkbox"/> High calorie | <input type="checkbox"/> Acidic | <input type="checkbox"/> Healthy |

24 Sensory and hedonic-oriented descriptors drawn from previous focus groups held in Senegal and in Europe.

Evaluation of drinks plus an ideal beverage.



Non-discriminant
balanced flavor
artificial, healthy,
natural, refreshing,
invigorating, new,
Antioxidant, red
fruits and different
/unknown



Correspondence analysis CATA frequencies

Consumer sensory profiling Check-all-that apply (CATA)



Tisane and ***new*** were among the less frequently chosen terms, and the most frequently selected CATA descriptors were ***fruity and red fruits***.



This suggests consumers in general did not recognize the drink as an extract of an unknown plant, misidentified it as a red fruits beverage.



Conclusions

- AFTER improved drinks were liked by most European consumers.
- Important drivers for further sensory optimization were uncovered using JAR, CATA techniques.
- Future studies should investigate the levels of marketing activities (pricing, distribution and promotional information – including nutritional and healthiness attributes) which will best support the successful introduction of Hibiscus in European markets.

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Thank you very much for your
attention

Merci beaucoup de votre attention

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