

# Sensory properties of pre-treated blast-chilled yam (*Dioscorea rotundata*) chips as a convenience food product



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## ABSTRACT

Yam (*Dioscorea spp.*) is a popular staple tropical root crop in West Africa. Its postharvest losses are between 30 - 40%. Pretreated packaged convenient yam would address postharvest losses of yam. *Dioscorea rotundata* var. *fitaa* was pretreated in a factorial design with sodium metabisulphite, water blanch and steam and subsequently blast chilled at hard (-24°C) and maxi chill (-26°C) temperature regimes. A Hedonic scale of 1-9 with twenty trained judges was employed to evaluate the sensory characteristics of fried yam chips (1.0cm<sup>2</sup> x 7.0cm sizes) and boiled yam (4.0cm<sup>2</sup> x 7.0cm sizes) on appearance, colour, aroma, taste, texture, mouthfeel, overall acceptability and crispness for fried yam chips. Sodium metabisulphite treatment showed the best overall acceptability for both boiled and fried treatments for maxi chilled than hard chilled against all other treatments. Overall acceptability for sodium metabisulphite was in the range of 7.2 - 7.9 with the highest attributes from appearance, taste, aroma and colour. The sensory ranges for water blanch treatments were 6.1 - 6.8 with the highest attributes for taste and aroma. Steam treatment recorded sensory ranges of 6.1 - 7.1, however in combination with sodium metabisulphite the ranges increased to 6.4 - 7.6 with the best sensory attributes for aroma, colour and taste. The sensory attributes indicated a potential for pretreated conveniently packaged *Dioscorea rotundata* var. *fitaa*.

## INTRODUCTION

Postharvest losses of yam are between 30 - 40% as a result of sprouting, respiration, transpiration, rot caused by mould and bacteria, insects, nematodes, rodents and mammals (FAO, 1985; Dumont, 1995).

The high water content of yam makes storage, transportation and marketing more difficult accounting for price discounting of 35-80% per unit of yams which is an obstacle for further increases in the production of yams (Bancroft, 2000).

As urban population prefer convenient foods there is the need to process yam into convenient forms to meet urban demand.

**OBJECTIVE:** To optimize pretreatment with sodium metabisulphite, water blanching and steam in two temperature regimes of blast freezing conditions and conduct sensory analysis on appearance, colour, crispness aroma, taste, texture, mouthfeel and overall acceptability of pretreated *Dioscorea rotundata* var. *fitaa* chips and boiled "ampesi".

## MATERIALS AND METHODS

### Material and Methods

Yam (*Dioscorea rotundata* var. *fitaa*)

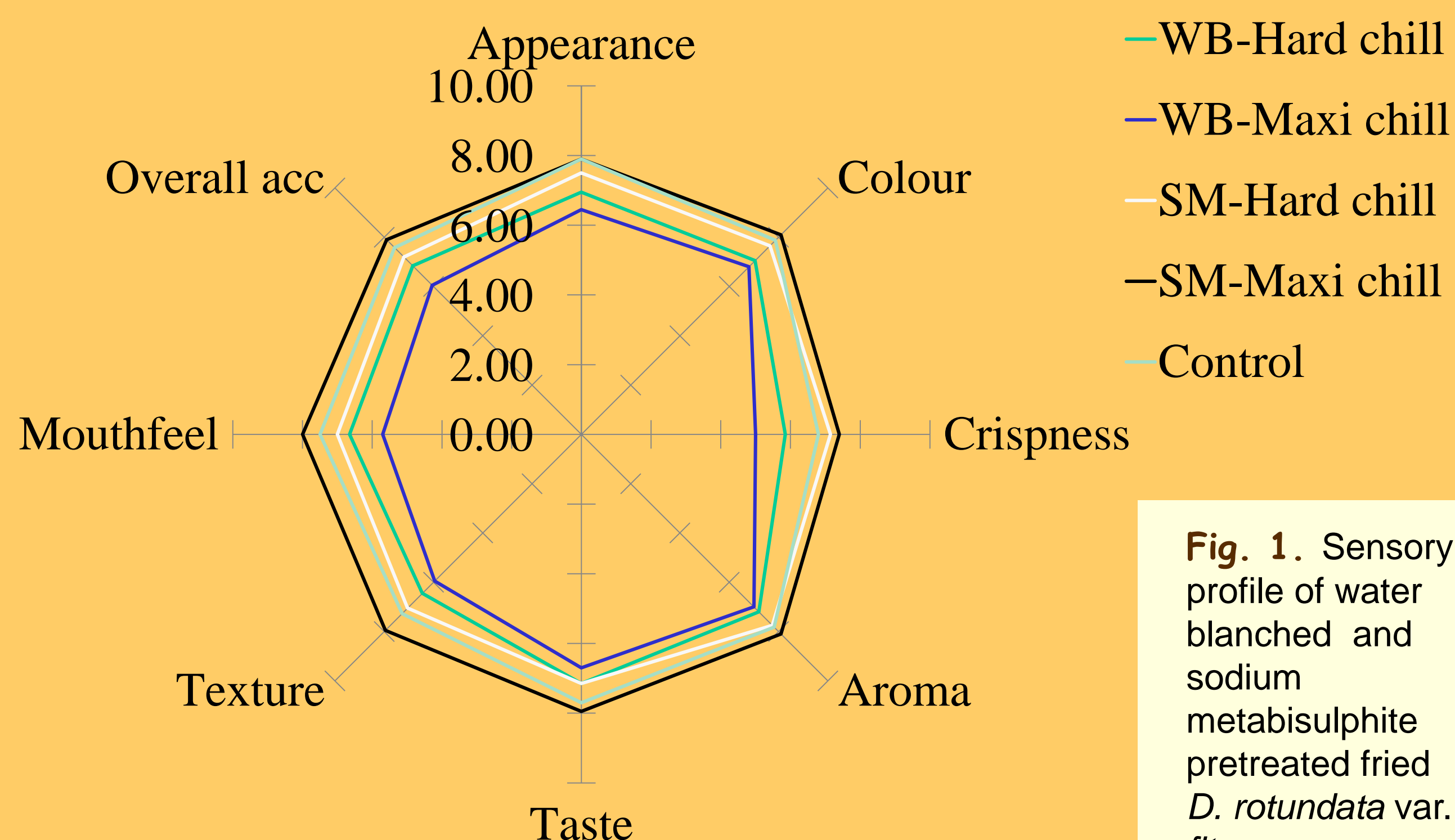
#### Pretreatment

- Dioscorea rotundata* var. *fitaa* was washed in tap water to remove dirt particles from the tubers. The washed tubers were peeled, washed in tap water, cut into chips (1.0cm<sup>2</sup> x 7.0cm sizes) and boiled "ampesi" (4.0cm<sup>2</sup> x 7.0cm sizes).
- Sample were immediately pretreated in a 3 x 2 factorial design with sodium metabisulphite, water blanch and steam and subsequently blast chilled at hard (-24°C) and maxi chill (-26°C) temperature regimes.
- Sodium metabisulphite solution was 1g/1000ml in distilled water.
- Water blanching was conducted at 100°C.
- Steam was generated from a General Electric Steam Generator No. 1366, Toronto, Canada set at 50 Pascal.
- All the samples were exposed in the various pretreatments for 1 - 3mins.
- Control samples were not pretreated after cutting into chips and boiled "ampesi" sizes.

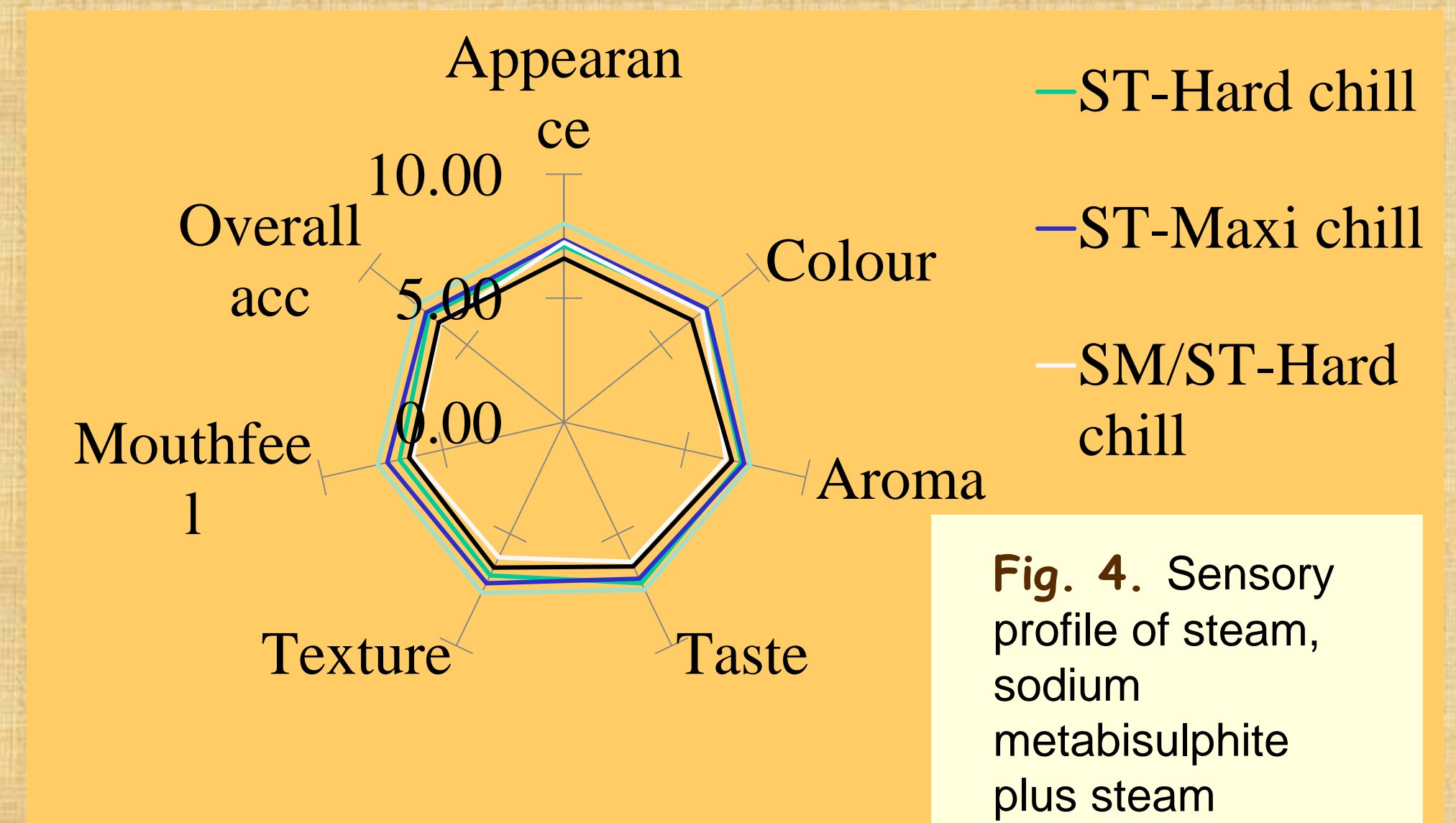
#### Sensory Analysis

- Twenty trained judges were employed to evaluate the sensory characteristics of *Dioscorea rotundata* var. *fitaa* fried chips and boiled "ampesi".
- Sensory attributes were on appearance, colour, aroma, taste, texture, mouthfeel, overall acceptability and crispness (Hood and Jood, 2005).
- A 9 - point Hedonic scale (1 = most preferred to 9 = least preferred) was employed.

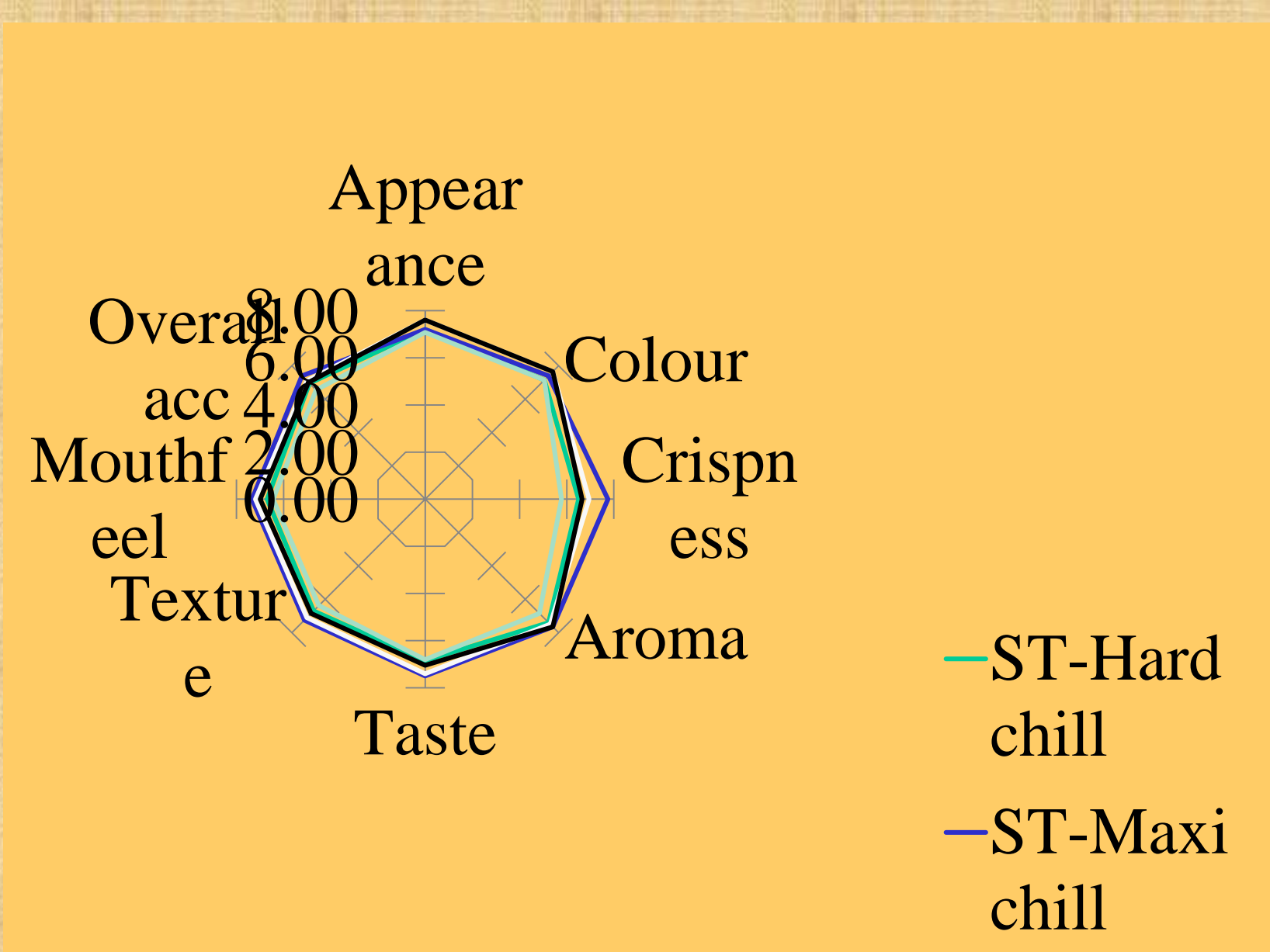
## RESULTS AND DISCUSSION



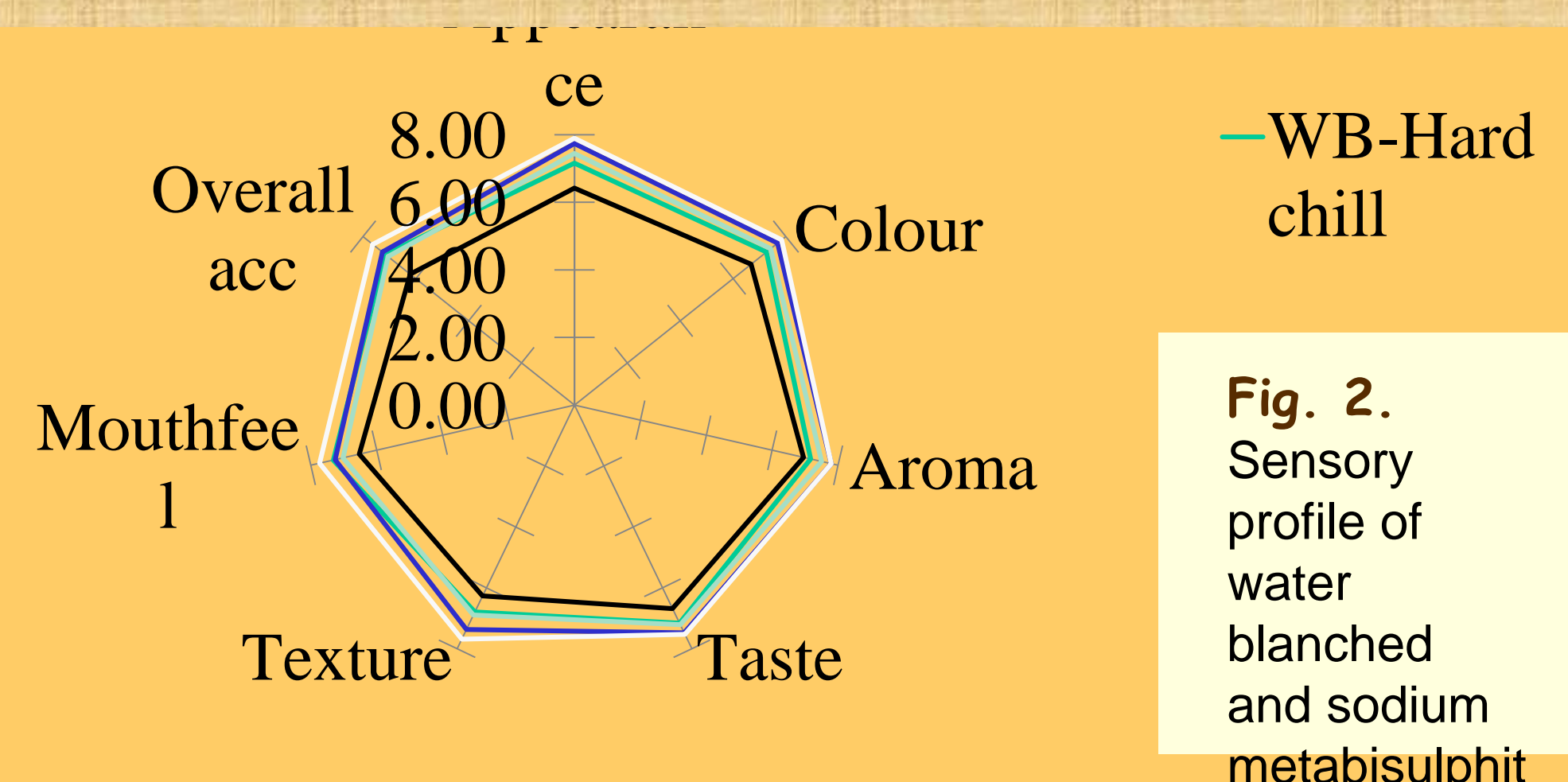
**Fig. 1.** Sensory profile of water blanch and sodium metabisulphite pretreated fried *D. rotundata* var. *fitaa*.



**Fig. 4.** Sensory profile of steam, sodium metabisulphite plus steam



**Fig. 3.** Sensory profile of steam, sodium metabisulphite plus steam pretreated fried *D. rotundata* var. *fitaa*.



**Fig. 2.** Sensory profile of water blanch and sodium metabisulphite

### Sensory Analysis

The sensory attributes scores identified sodium metabisulphite with maxi chill pretreatment for fried *D. rotundata* var. *fitaa* as the best overall accepted product. Significant acceptance was observed for *D. rotundata* var. *fitaa* boiled "ampesi" in sodium metabisulphite with hard chill pretreatment.

## CONCLUSION

*D. rotundata* var. *fitaa*, chips and boiled "ampesi" pretreated in 0.1% sodium metabisulphite at -26°C blast chilling are appropriate for packaged convenient food uses.

## REFERENCES

- Bancroft, R., (2000). Final Technical Report, Natural Resources Institute, University of Greenwich, United Kingdom. pp. 51.
- Dumont, R. (1995). International Institute of Tropical Agriculture, Ibandan, Nigeria, Summary Document, 25 May 1995.
- FAO, (1985). Production Year Book 38. Rome, Italy.
- Hooda, S. and Jood, S., (2005). *Food Chemistry*, 3, 427-435.