Survey of traditional leafy vegetables-based recipes in southern Benin and nutritional values of dishes in Kpomasse district

Sossa Vihotogbe C., N’Danikou S., Akissoe N.H, Honfoga J., Assogba Komlan F., Simon S., and H. Jaenicke
LEAFY VEGETABLES: CONCEPT AND NUTRITIONAL IMPORTANCE

- Leafy vegetable = rich food: protein, minerals, vitamin, antinutritional and bioactive
- Traditional Vegetables → key role in daily diets of communities in Benin
- Africa, traditional leafy vegetable are consumed after processing (trituration, blanching, precooling, cooking)

Orech et al. (2005); Akubugwo et al. (2007); Ejoh et al. (2008); Afolayan & Jimoh (2009)
LEAFY VEGETABLES: CONCEPT AND NUTRITIONAL IMPORTANCE

- Leafy vegetable added in stew, soup, sauce, fritter
- In Bénin, leafy vegetable are mostly consumed like sauce: «mangniyan», «mansiso», «mansinon» etc...
LEAFY VEGETABLES: CONCEPT AND NUTRITIONAL IMPORTANCE

Cooking

- Reduction level of mineral, phenolics compounds, carotenoid, Vit C, antioxydant capacity and antinutritionnels factors

Turkmen et al. (2001); Zhang & Hamauzu (2004); Mepha et al. (2007); Oscarsson & Savage (2007); Ejoh et al. (2008)
LEAFY VEGETABLES: CONCEPT AND NUTRITIONAL IMPORTANCE

Blanching

✓ Decrease mineral and vitamin C

✓ Decrease inhibitor activity of trypsine and chymotrypsine

✓ Inactivate enzym, elimination of bad taste

Mepha (2007); Mosha (1999); Fellow (1990)
Research Questions

Recipes integrating four TVs consumed in South of Benin?

Nutritional values of dishes based on traditional leafy vegetables?
SO1: Collect recipes based on LfV

Survey area

Survey carried out in 21 localities
In three districts: Ouidah, Kpomasse and Grand-Popo in southern Benin
SO1: Collect recipes based on LfV

Respondents and species of interest

Members of health clubs of project area, selected by APRETECTRA NGO

Respondents: women, 15 to 21 in each district

Four species selected by health clubs
Ocimum gratissimum L.

Talinum triangulare (Jacq.) Willd.

Moringa oleifera Lam.

Cleome gynandra L.
SO1: Collect recipes based on LfV

Data collection

56 individual interviews

Information collected: species sold, use patterns and preferences, age categories, consumption frequencies, most consumed species, recipes, medicinal attributes, species acquisition modes, and preservation techniques

Data analysis

Descriptive stats, ANOVA, Spearman’s test
SO2: Nutritional values of dishes based on traditional leafy vegetable

Nutritional value of leafy vegetables

Collection of leafy vegetables

Traitements (sorting, cleaning, draining)

Drying (60 °C)

Milling

Moisture (AOAC,1995)

Macronutrients (AOAC,1995)

Polyphenols content (Kayodé et al., 2007)

Antioxydant activity (Zhang and Hamazu, 2004)
SO2: Nutritional values of dishes based on traditional leafy vegetable

Nutritional values of dishes

- Choice of widespread recipes based on survey results
- Random choice of 2 housewifes per processing methods
SO2: Nutritional values of dishes based on traditional leafy vegetable

Preparation of samples

* samples with or without source of protein

* Milling

Biochemical analysis (FSA/UAC, Benin)

Statistical analysis: ANOVA (Statistica)
## Key Results

### Main recipes from the 4 target species

<table>
<thead>
<tr>
<th>Recipes groups</th>
<th><em>O. gratissimum</em></th>
<th><em>C. gynandra</em></th>
<th><em>M. oleifera</em></th>
<th><em>T. triangulare</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Precooked with / without water and cooked in palm nut sauce</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>Precooked with / without water and cooked in oil sauce</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>Fresh leaves directly cooked in palm nut or oil sauce</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>M4</td>
<td>Triturated and precooked leaves in water, cooked in palm nut sauce</td>
<td>-</td>
<td>Triturated precooked leaves in water cooked in palm nut sauce</td>
<td>-</td>
</tr>
</tbody>
</table>
Key Results

Species Consumption History

No cultural (ethnicity) influence on the preference for any of the four selected species (p>0.05).
## Key Results

### Consumption patterns (%)

<table>
<thead>
<tr>
<th>Recipe groups</th>
<th>Ocimum gratissimum</th>
<th>Talinum triangulare</th>
<th>Moringa oleifera</th>
<th>Cleome gynandra</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>36,36</td>
<td>38,18</td>
<td>38,18</td>
<td>14,55</td>
</tr>
<tr>
<td>M2</td>
<td>52,73</td>
<td>89,09</td>
<td>80,00</td>
<td>34,55</td>
</tr>
<tr>
<td>M3</td>
<td>1,82</td>
<td>-</td>
<td>-</td>
<td>1,82</td>
</tr>
<tr>
<td>M4</td>
<td>12,73</td>
<td>-</td>
<td>1,82</td>
<td>-</td>
</tr>
</tbody>
</table>
Key Results

3 recipes with *Moringa, Ocimum*

* precooking + cooking with palm oil
* precooking + cooking with palm nut juice
* trituration + precooking + cooking with palm oil

2 recipes for *Talinum*

* precooking of leaves + cooking with palm oil
* precooking of leaves + cooking with palm nut juice
Nutritional values of *Talinum* leaves and dishes (DB)

- Protein of *T* based food (16.53-23.02) > Raw *Talinum* (16.53) > R dish
- Ash (8.28-12.81%) < 22.89: loss of mineral during precooking
- Fat (27.65-46.18) > R dish
- Crude fiber (6.01-9.03) < 12.58

No significant difference between nutritional values of dishes with/without fish
Nutritional values of *Ocimum* leaves and dishes (DB)

- Protein of *O.* based food (16.33-32.68) > Raw O. (16.05) > R dish
- Ash (10.62-14.78%) / 13.47 (used of Kanmu)
- Fat (27.65 -46.18) > R dish
- Crude fiber (6.01-9.03) < 11.25

No significant difference between ash level of dishes with/without fish
Phenolics compounds and antioxidant activity of *Talinum* leaves and dishes (DB)

**Graph:**
- **Phenolics compounds**
- **Antioxidant activity**

- **TP (39-49)/ Raw T (45):** reduction lixiviation in precooking water
- **AOA (11.53-27.72) < Raw T (32.28):** reduction 14.13 to 64.28%

**Significant difference** between TP and AOA of dishes (oil) with/without fish
Phenolics compounds and antioxidant activity of *Ocimum* leaves and dishes (DB)

TP (33-45)/ Raw T (59): reduction lixiviation in precooking water

AOA (6.95-39.05) < Raw T (47.35): reduction 17 to 83.62%

No significant difference between TP and AOA of dishes with/without fish
Conclusion

-12 recipe groups were collected on the 4 species

- *Talinum* and *Moringa* stand for important vegetables in diets in the surveyed communities, unlike *Cleome* and *Ocimum*

-No age or cultural (ethnicity) influence on the preference for any of the 4 study species
Conclusion

Dishes based on leafy are great sources of protein, fiber

Housewives must reduce quantity of fat

Reduction of precooking time to reduce mineral loss

Further research: determination of other antinutritional factors and micronutrients constituents contains in dishes
Acknowledgments

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Thank you for your attention