Assessment of African Indigenous Vegetables in Zambia and Malawi

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Chief of Party - UBALE
The story of *denje*

**Scientific Name**
denje = *Corchorus olitorius*

**Nutrients:**
- Beta-carotene: *extremely high*
- vitamin E: *medium*
- riboflavin: *high*
- folic acid: *extremely high*
- ascorbic acid: *extremely high*
- calcium: *medium to high*
- iron: *high to extremely high*
- protein: 4.5%

**Source:**
(AVRDC 2015: http://avrdc.org/jute-mallow-corchorus-olitorius/)
Background

• Key terminology
  – African Indigenous Vegetables (AIV)
  – African Leafy Vegetables (ALV)
  – Wild Edible Plants (WEP)
  – Underutilized/Neglected/Orphan Crops
  – Traditional/native/local foods
  – Scientific vs. traditional classification systems

• Cultural significance
  – Closely linked to food culture, identity
  – Alimentary traditions (Towns et al. 2013)

Background

- Agricultural & environmental considerations
  - 75% of world’s food generated from 12 plant & 5 animal species (FAO 1999)
  - Sub-Saharan Africa has ~ 40,000 species in which 1000 are vegetables (Maundu et al. 2009)
  - Adapted to local conditions

- Nutritional considerations
  - AIVs richer than exotics in protein, vitamins, iron & other nutrients (Yang & Keding 2009)
  - Few countries have inventories of AIV diversity or consumption patterns

## Monetary value of AIVs

**Volume and value of annual sales for three most important AIVs to consumers by retailers**

(Weinberger and Pichop 2009)

<table>
<thead>
<tr>
<th>Country</th>
<th>n</th>
<th>Total volume (kg)</th>
<th>Average volume (kg) per retailer</th>
<th>Average price (US$/kg)</th>
<th>Total Turnover (US$)</th>
<th>Average annual turnover per retailer (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>145</td>
<td>656,602</td>
<td>4528</td>
<td>0.61</td>
<td>401,578</td>
<td>2,769</td>
</tr>
<tr>
<td>Ivory Coast</td>
<td>140</td>
<td>99,877</td>
<td>713</td>
<td>0.54</td>
<td>53,544</td>
<td>382</td>
</tr>
<tr>
<td>Uganda</td>
<td>153</td>
<td>582,338</td>
<td>3806</td>
<td>0.31</td>
<td>179,884</td>
<td>1,176</td>
</tr>
<tr>
<td>Tanzania</td>
<td>179</td>
<td>1,986,760</td>
<td>11,099</td>
<td>0.23</td>
<td>451,789</td>
<td>2,524</td>
</tr>
<tr>
<td>Senegal</td>
<td>143</td>
<td>1,654,474</td>
<td>11,570</td>
<td>1.47</td>
<td>2,437,867</td>
<td>17,048</td>
</tr>
<tr>
<td>South Africa</td>
<td>88</td>
<td>27,324</td>
<td>311</td>
<td>3.31</td>
<td>90,486</td>
<td>1,028</td>
</tr>
<tr>
<td>Kenya</td>
<td>158</td>
<td>4,284,120</td>
<td>27,115</td>
<td>0.44</td>
<td>1,900,007</td>
<td>12,025</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>9,291,495 kg</strong></td>
<td></td>
<td></td>
<td><strong>$ 5,515,155</strong></td>
<td></td>
</tr>
</tbody>
</table>

Assessment Objective

CRS will carry out an African Indigenous Vegetables (AIVs) assessment in the Chipata/Lundazi areas of Zambia & the Chikwawa area of Malawi:

- To assess *types & availability of drought-resistant AIVs*
- To assess *households’ AIV preferences*
- To identify at least *two recipes* suitable for young children, pregnant & lactating women
- To assess *availability of AIV seeds* in local markets
Field Sites

Zambia
- MAWA Project: USAID-funded Feed the Future project (2012-2017) aiming to improve food & economic security
- Eastern Providence (Chipata & Lundazi)
- Chewa, Ngoni & Tumbuka speakers

Malawi
- UBALE project: USAID Food for Peace project (2014-2019) aiming to increase food security, improve nutrition & strengthen disaster risk
- Southern Region (Chikwawa)
- Chichewa speakers
Methodology

Qualitative Methods

- Focus group discussions
- Key Informant Interviews
- Market Vendor Interviews
- 105 total participants
  - 55 participants (Zambia)
  - 50 participants (Malawi)
Methodology

Botanical Identifications

- Market Purchases
- Informal Field Collections
- Photographs
- Local Flora Resources
- Visit to the National Herbarium & Botanical Garden of Malawi (Zomba)

Literature review of Nutritional Properties

- AVRDC
- Zambia Food Composition Database
Findings:
Key similarities- Household perceptions

Zambia & Malawi

• responded favorably to indigenous vegetables & reported that all household members consume them daily


• used as relishes alongside a traditional maize porridge

• most AIVs are consumed fresh, but are also dried and stored for year-round access

“UBALE should support the old ones too, not just the modern ones” – male participant from key informant interview

“...children love eating them; they don’t know their value but they love the taste.” – mother from focus group discussion
Findings:
Key similarities - Plant parts, types, & seed

Malawi & Zambia

- most frequently cited were leaves of cultivated plants, wild herbs/ground climbers
- wild vegetables were reported to typically grow only in the rainy season with low water requirements
- Only seeds of cultivated AIVs were collected, saved & sold on the local market
Findings: Key differences

Zambia

- 35 plants mentioned
- Mushrooms frequently cited
- Use of traditional chikwati storage ball

Malawi

- 16 plants mentioned
- General hesitancy discussing AIVs, especially those that grew wild
- Younger generations mentioned more cultivated plants
## Findings

### Most frequently cited leafy vegetables in Chipata and Lundazi areas

<table>
<thead>
<tr>
<th>Plant Form</th>
<th>Local Name (Chewa/Ngoni)</th>
<th>English Name</th>
<th>Scientific Name</th>
<th>Nutritional Qualities</th>
<th>Recipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>wild herb</td>
<td>lumanda</td>
<td>cranberry</td>
<td><em>Hibiscus acetosella</em> Welw. ex Hiern</td>
<td>85 food energy (ME) cal, 13.82 g protein, 1.42 g fat, 0.55 mg calcium, 21.1 mg iron, 0.01 mg zinc, 28.93 mg vitamin C per 100 grams of boiled leaves¹</td>
<td>lumanda + soda + g. nut + tomato + salt = boil for 5 mins</td>
</tr>
<tr>
<td>wild herb</td>
<td>katate</td>
<td>hibiscus</td>
<td><em>Ceratotheca sesamoides</em> Endl.</td>
<td>65 food energy (ME) cal, 5.25 g protein, 0.45 g fat, 0.63 mg calcium, 16.69 mg iron, 0.11 mg zinc, and 59.25 mg vitamin C per 100 grams of fresh leaves¹</td>
<td>katate + soda + tomato + salt = boil for 5 mins</td>
</tr>
<tr>
<td>wild herb</td>
<td>bondwe</td>
<td>false sesame</td>
<td><em>Amaranthus</em> spp.</td>
<td>High: folic acid, ascorbic acid, calcium, iron</td>
<td>bondwe + salt + tomato + oil = boil for 10 mins</td>
</tr>
<tr>
<td>wild climber</td>
<td>mulozi</td>
<td>amaranth</td>
<td><em>Adenia gummifera</em> (Harv.) Harms</td>
<td>Medium: Beta-carotene, vitamin E, riboflavin</td>
<td>mulozi + soda + g nuts + tomato = boil for 3-5 mins</td>
</tr>
<tr>
<td>cultivated climber</td>
<td>chibwabwa</td>
<td>monkey rope</td>
<td><em>Cucurbita maxima</em> Duchesne</td>
<td>High: ascorbic acid</td>
<td>chibwabwa + salt + g. nuts + soda + tomato = boil for 5 mins</td>
</tr>
</tbody>
</table>

### Findings

#### Most frequently cited leafy vegetables in the Chikwawa area

<table>
<thead>
<tr>
<th>Plant Form</th>
<th>Local Name</th>
<th>English Name</th>
<th>Scientific Name</th>
<th>Nutritional Qualities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivated climber</td>
<td>Nkhawni (Chichewa)</td>
<td>Pumpkin leaves</td>
<td><em>Cucurbita maxima</em> Duchesne</td>
<td>High: ascorbic acid, Medium: Beta-carotene, vitamin E, riboflavin, calcium, 4.0% protein$^2$</td>
</tr>
<tr>
<td>Wild climber</td>
<td>Punde (Chichewa)</td>
<td>Wild sweet potato leaves</td>
<td><em>Ipomoea eriocarpa</em> R. Br.</td>
<td>Medium to high: ascorbic acid, Medium: Beta-carotene, vitamin E, folic acid, iron, calcium, 2.5% protein$^2$</td>
</tr>
<tr>
<td>Wild herb</td>
<td>Bonogwe (Chichewa)</td>
<td>Amaranth</td>
<td><em>Amaranthus</em> sp.</td>
<td>High: folic acid, ascorbic acid, calcium, iron, Medium: Beta-carotene, vitamin E, folic acid, iron, 2-4% protein$^2$</td>
</tr>
<tr>
<td>Cultivated tree</td>
<td>Sangoa (Chichewa)</td>
<td>Moringa</td>
<td><em>Moringa</em> sp.</td>
<td>Extremely high: ascorbic acid, Medium: calcium, Extremely high: Beta-carotene, High: vitamin E, folic acid, calcium</td>
</tr>
<tr>
<td>Cultivated climber</td>
<td>Chitambe (Chichewa)</td>
<td>Cowpea leaves</td>
<td><em>Vigna unguiculata</em> (L.) Walp.</td>
<td>Medium: ascorbic acid, 3-4% protein</td>
</tr>
</tbody>
</table>

#### Recipe
- **Chibwabwa**: salt + g. nuts + soda + tomato = boil for 5 mins
- **Bondwe**: salt + tomato + oil = boil for 10 mins
- **Sangoa**: salt + g. nut paste + tomato = boil for 5 mins
- **Chitambe**: g. nuts + tomato = boil for 5 mins

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Key Lessons Learned

• Overlap in preferred leafy vegetable species, but Zambia with larger diversity
• Need for educational activities around stigma of AIVs in Malawi
• Sodium bicarbonate potentially negative effects
• Most AIVs have known nutritional information but additional research needed
### Next Steps

#### Agricultural Integration

1. Explore collaboration with AVRDC on AIV seed kits

2. Incorporate AIV into agricultural activities of UBALE/MAWA
   - *DINER fairs*
   - *Kitchen Gardens*

#### Behavior Change

1. Promote consumption & drying of nutrient rich AIVs (especially wild ones) in nutrition activities of UBALE/MAWA
   - Community-led
     - Complementary Feeding and Learning Sessions
     - Care Group

2. Caution the use of sodium bicarbonate in recipe preparation
Remaining Questions

- **Food processing**: Does any listener have experience in sodium bicarbonate use in traditional dishes? How does it influence the integrity of the nutrients, particularly given the combination of several ingredients?

- **Drying & Storage**: What are the main barriers to drying and storing leafy vegetables to encourage year-round consumption?

- **Environmental**: Given changing climate patterns, how do AIVs fit into larger discussions around food security and dietary diversity?
*Acknowledgements*

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