Assessment of African Indigenous Vegetables in Zambia and Malawi

Alexandra M. Towns
Dyna Khonde
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

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

(AMTowns/CRS)
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>
</tr>
</thead>
<tbody>
<tr>
<td>wild herb</td>
<td>lumanda</td>
<td>cranberry</td>
<td>\textit{Hibiscus acetosella} Welw. ex Hiern</td>
</tr>
<tr>
<td>wild herb</td>
<td>katate</td>
<td>hibiscus</td>
<td>\textit{Ceratotheca sesamoides} Endl.</td>
</tr>
<tr>
<td>wild herb</td>
<td>bondwe</td>
<td>false sesame</td>
<td>\textit{Amaranthus} spp.</td>
</tr>
<tr>
<td>wild climber</td>
<td>mulozi</td>
<td>amaranth</td>
<td>\textit{Adenia gummifera} (Harv.) Harms</td>
</tr>
<tr>
<td>cultivated climber</td>
<td>chibwabwa</td>
<td>monkey rope</td>
<td>\textit{Cucurbita maxima} Duchesne</td>
</tr>
</tbody>
</table>

### Nutritional Qualities

<table>
<thead>
<tr>
<th></th>
<th>lumanda + g. nut + tomato + salt = boil for 5 mins</th>
<th>katate + soda + tomato + salt = boil for 5 mins</th>
<th>bondwe + salt + tomato + oil = boil for 10 mins</th>
<th>mulozi + g nuts + soda + tomato = boil for 3-5 mins</th>
<th>chibwabwa + salt + g. nuts + soda + tomato = boil for 5 mins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional Qualities</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 leaves$^1$</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 leaves$^1$</td>
<td>High: folic acid, ascorbic acid, calcium, iron</td>
<td>Medium: Beta-carotene, vitamin E, riboflavin, unknown</td>
<td>High: ascorbic acid</td>
</tr>
<tr>
<td></td>
<td>2-4% protein$^2$</td>
<td></td>
<td>Medium: Beta-carotene, vitamin E, riboflavin</td>
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### Findings

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

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<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>cultivated climber</td>
<td>nkhnwi (Chichewa)</td>
<td>pumpkin leaves</td>
<td><em>Cucurbita maxima</em> Duchesne</td>
</tr>
<tr>
<td>wild climber</td>
<td>punde (Chichewa)</td>
<td>wild sweet potato</td>
<td><em>Ipomoea eriocarpa</em> R. Br.</td>
</tr>
<tr>
<td>wild herb</td>
<td>bonogwe (Chichewa)</td>
<td>amaranth</td>
<td><em>Amaranthus</em> spp.</td>
</tr>
<tr>
<td>cultivated tree</td>
<td>sangoa (Chichewa)</td>
<td>moringa</td>
<td><em>Moringa</em> sp.</td>
</tr>
<tr>
<td>cultivated climber</td>
<td>chitambe (Chichewa)</td>
<td>cowpea leaves</td>
<td><em>Vigna unguiculata</em> (L.) Walp.</td>
</tr>
</tbody>
</table>

#### Nutritional Qualities

- **High:** ascorbic acid
- **Medium:** Beta-carotene, vitamin E, riboflavin, calcium
- **4.0% protein**

- **High:** folic acid, ascorbic acid, calcium, iron
- **Medium:** Beta-carotene, vitamin E, folic acid, iron, calcium
- **2-4% protein**

- **Extremely high:** Beta-carotene
- **High:** vitamin E, folic acid, calcium
- **Medium ascorbic acid**
- **3-4% protein**

#### 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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• USAID