AVRDC The World Vegetable Center

Evaluation of Important Nutrients and Phytocompounds in Indigenous Vegetables from Tropical Asia and Africa

8th IFDC, Bangkok, 1-3 October 2009

Ray-Yu Yang

AVRDC – The World Vegetable Center, Taiwan

AVRDC The World Vegetable Center

Mission

"Alleviate poverty and malnutrition in the developing world through increased production and consumption of safe vegetables"

AVRDC The World Vegetable Center

AVRDC regional centers and project offices

AVRDC The World Vegetable Center

Vegetables:

- The key sources of micronutrients and beneficial phytocompounds
- Contribute to diversity of ecosystem, agricultural system and human diets

AVRDC The World Vegetable Center

Germplasm accessions conserved at AVRDC

	Principal crops	Other crops	Total
No. of accessions	**42,820**	**13,310**	**56,130**
No. of genera	7	153	160
No. of species	111	226	337
No. of countries of origin			150

5 www.avrdc.org

AVRDC The World Vegetable Center

Over 5000 varieties of Indigenous Vegetables ...

are maintained in the AVRDC collection

Ivy gourd
Coccinia grandis

Tropical violet
Asystasia gangetica

Jute mallow
Corchorus olitorius

Okra
Abelmoschus esculentus

Sweet potato vine
Ipomoea batatas

Drumstick tree
Moringa oleifera

6 www.avrdc.org

AVRDC The World Vegetable Center

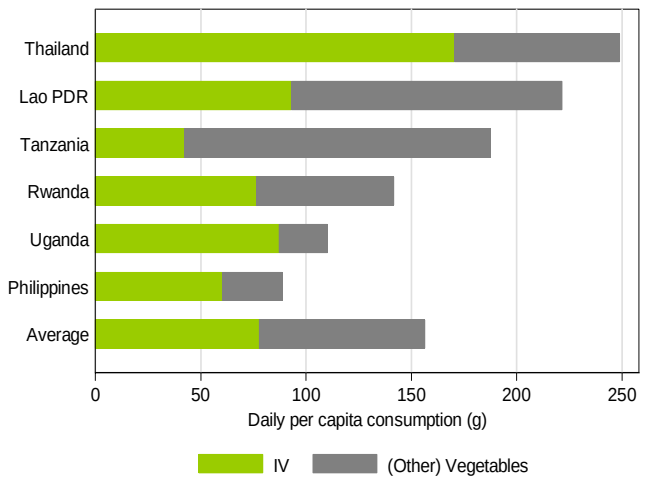
Indigenous vegetables

- Native to the regions
- Long been used in diets
- Important role in biodiversity and diverse diet
- Grown locally on a small scale
- Often tolerant to environmental stress
- Most are underutilized
- Limited Information on nutrient values, bioactive compounds, anti-nutrients, and potential health hazards

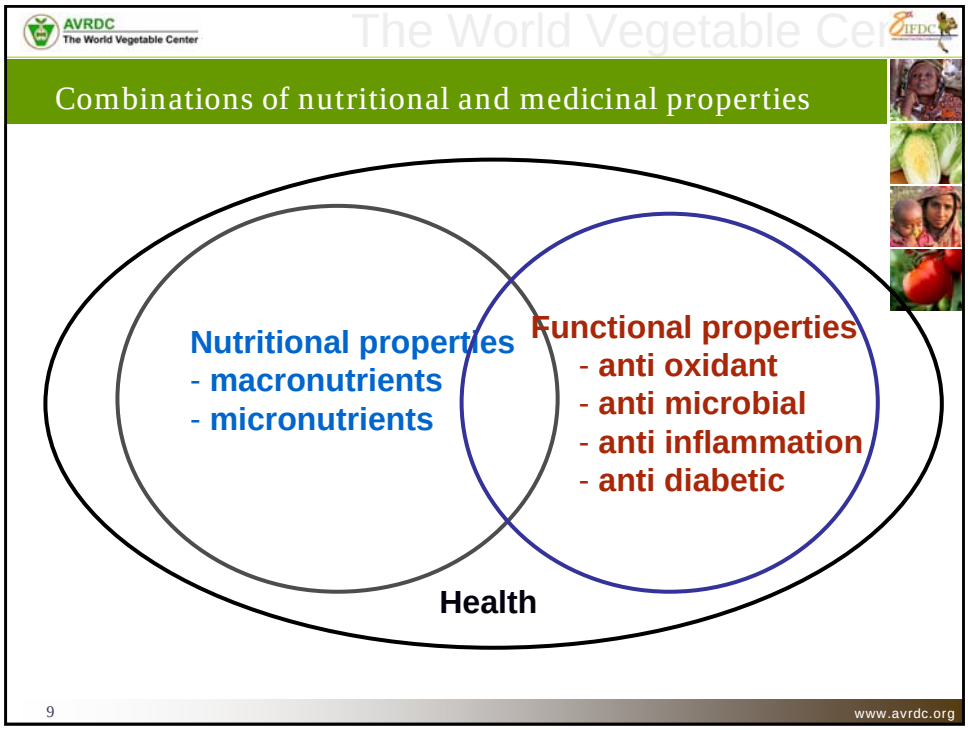
AVRDC The World Vegetable Center

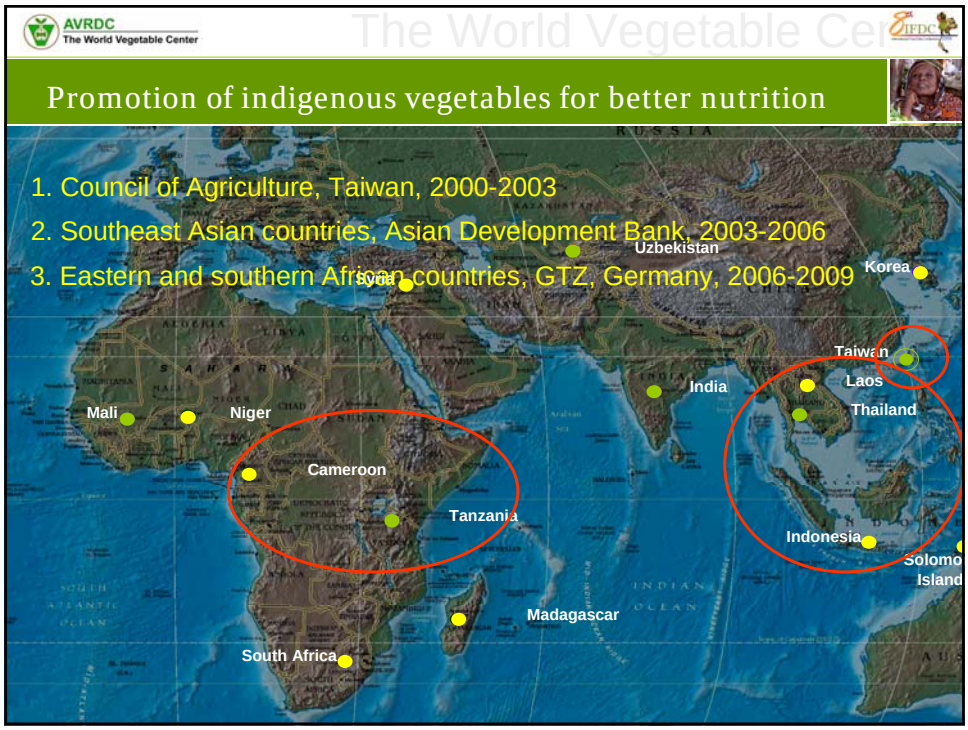
Consumption of indigenous vegetables



Source: Surveys conducted by AVRDC in collaboration with NARES in respective countries

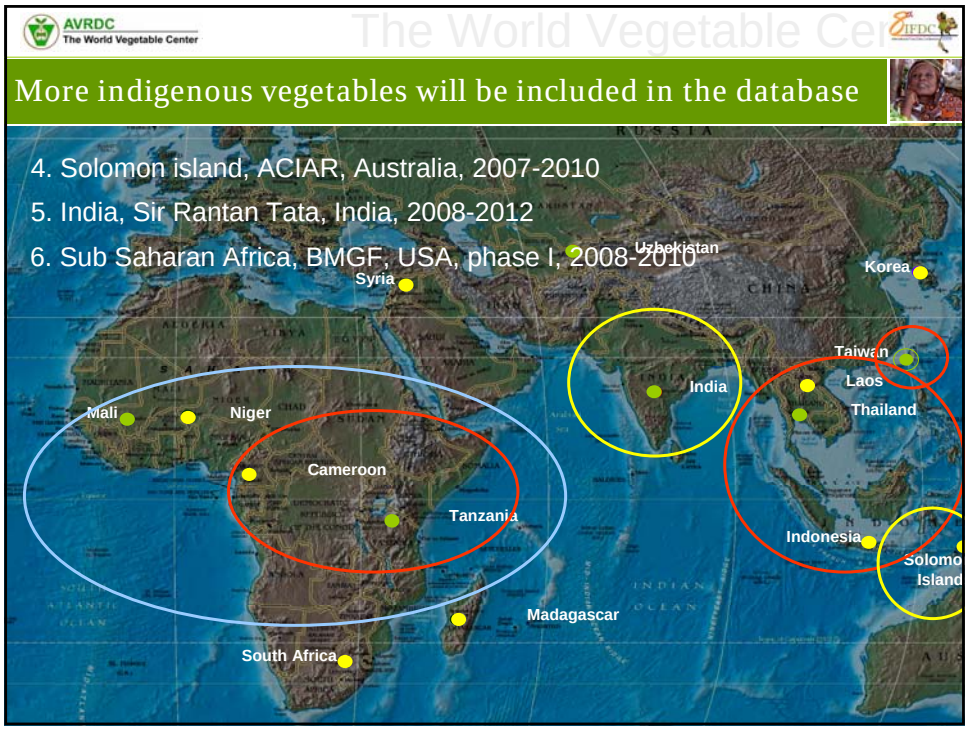




8th International Food Data Conference

October 1-3, 2009

Bangkok, Thailand


AVRDC The World Vegetable Center
More indigenous vegetables will be included in the database
4. Solomon island, ACIAR, Australia, 2007-2010
5. India, Sir Rantan Tata, India, 2008-2012
6. Sub Saharan Africa, BMGF, USA, phase I, 2008-2010
Uzbekistan
Syria
Korea
Taiwan
India
Laos
Thailand
Mali
Niger
Cameroon
Tanzania
Indonesia
Solomo
Island
Madagascar
South Africa


AVRDC The World Vegetable Center
Hidden Treasures in Indigenous Vegetable Garden
Southern Taiwan: hot-wet, cool-dry tropical climates
12
www.avrdc.org

Samples

- Evaluation among species
- One harvest
- Harvest stage based on local practices
- Edible portion
- One bulk sample from >10 plants, 2-5 kg
- Immediately processed in laboratory
  - Cleaned, homogenized
  - oven dry, 50 ^{0}C, 1-2 days
  - freeze dry, 2days
  - -70 ^{o}C
- Ground into powder (0.5 mm) for dry samples, stored at -20^{o}C

Indigenous vegetables database

- Nutritional quality
  - Protein (AOAC)
  - Vitamins
    - Carotenoids (violaxathin, neoxanthin, lutein, α-carotene, β-carotene) (HPLC)
    - Vitamin C (colorimetric)
    - α–, δ-, γ-Tocopherols (HPLC)
    - Folate (Microbial assay)
  - Minerals: (AAS)
    - Calcium
    - Iron
    - Zinc
- Eating quality
  - Dry matter
  - Crude fiber
  - Free sugars (reducing sugar)
- Anti-nutrient factors
  - Oxalate (HPLC)
- Health promoting properties
  - Flavonoids (HPLC)
  - Total Phenolics (Folin)
  - Antioxidant activities (ABTS, DPPH, SOS)
  - Anti-microbial activities (diffusion)

More data will be generated

On going

- Oil and n-3 fatty acid
- Functional properties (animal cell models)
  - anti diabetic activities
  - Anti and/or pro-inflammation
  - Anti cancers
  - Horticultural traits

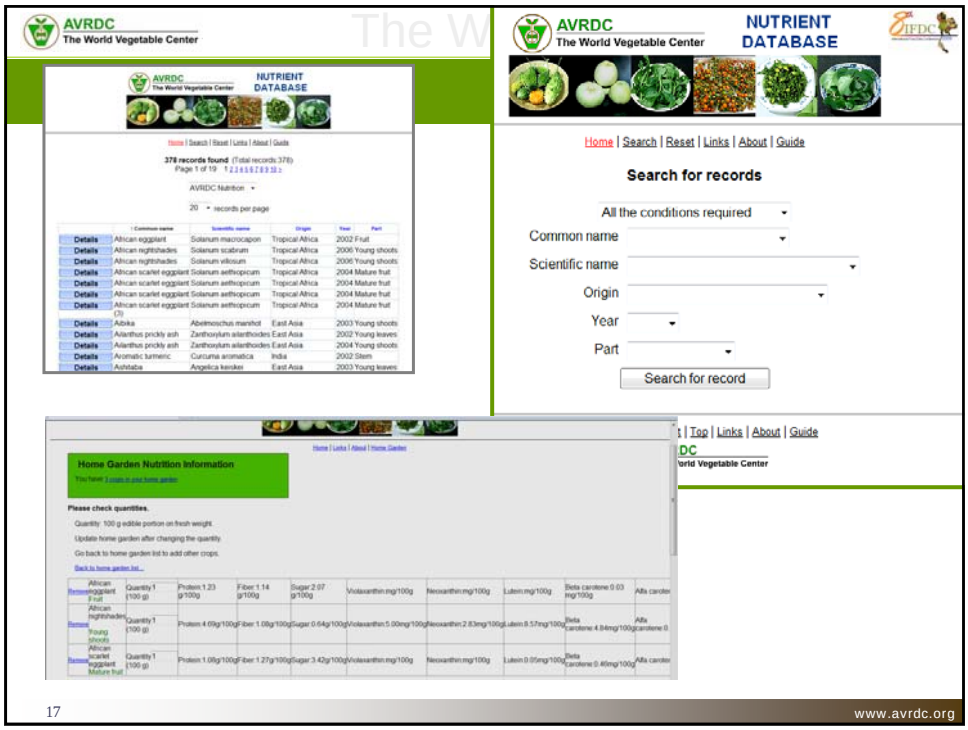
In planning

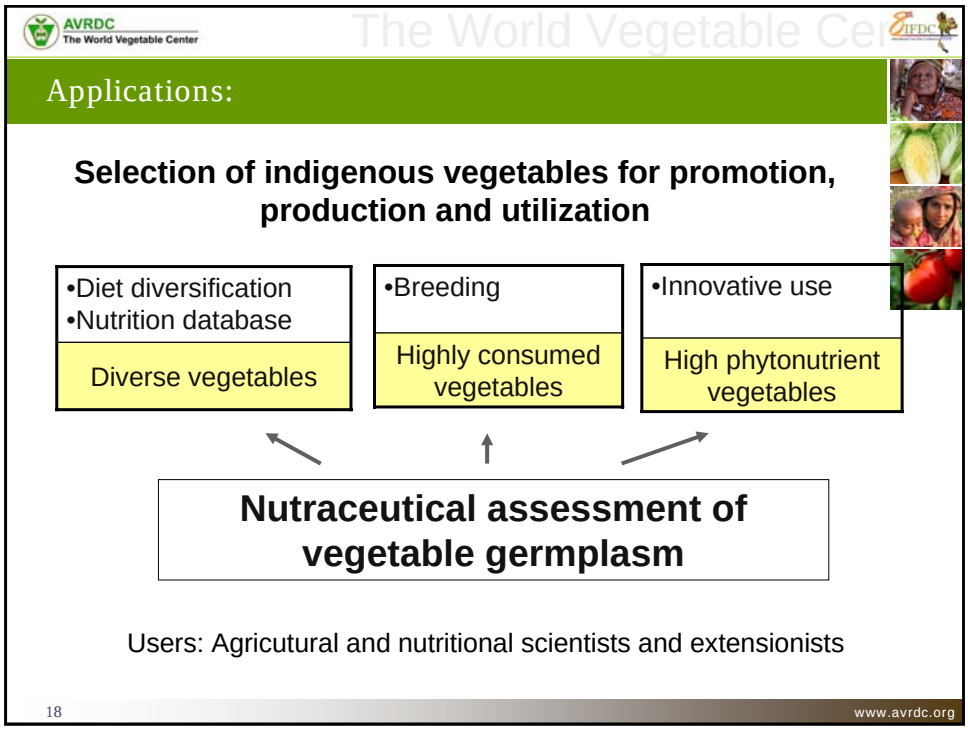
- Potential negative factors:
  - Alkaloid groups
- Bitter-taste compounds
- Other functional properties

Web based database

- The AVRDC nutrient database was developed using MySQL database and PHP application powered by DaDaBIK

- MySQL : My Structured Query Language
- DaDaBIK : DaDaBIK is a free PHP application that allows you to easily create a highly customizable front-end for a database in order to search, insert, update and delete records; all you need to do is specifying a few configuration parameters.

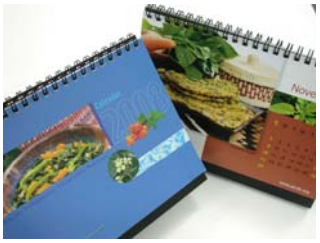

AVRDC
The World Vegetable Center
NUTRIENT DATABASE
Home | Search | Reset | Links | About | Guide
Search for records
All the conditions required
Common name
Scientific name
Origin
Year
Part
Search for record
Home Garden Nutrition Information
Please check quantities.
Quantity: 100 g edible portion on fresh weight.
Update home garden after changing the quantity.
Go back to home garden list to add other crops.
17
www.avrdc.org


AVRDC
The World Vegetable Center
Applications:
Selection of indigenous vegetables for promotion, production and utilization
•Diet diversification
•Nutrition database
Diverse vegetables
•Breeding
Highly consumed vegetables
•Innovative use
High phytonutrient vegetables
Nutraceutical assessment of vegetable germplasm
Users: Agricutural and nutritional scientists and extensionists
18
www.avrdc.org

AVRDC The World Vegetable Center

Applications

- Calculation of vegetable recipes
  - Eastern African countries
  - India
  - Southeast countries



AVRDC The World Vegetable Center

Applications

- Evaluation of nutritional yields of home gardens and school gardens growing indigenous vegetables