Approach for improving cultivars of Spider plant for Africa: reaching the ultimate target group

E.G. Achigan-Dako, P. Maundu, O.D. Sogbohossou, E. Deguenon, A. Ebert, E. Schranz

The Cleonomics Consortium

Outline

- The Spider plant: an orphan crop?
- The need for cultivar improvement
- Knowledge co-creation approach
- Science-based evidence
- Capacity building
- Lesson learnt and way forward

The Spider plant: no orphan crop

- A wild and spontaneous plant found around home settlements
- Largely used by local communities as leafy vegetable
- Reported as nutritious food with high amount in beta-carotene (pro Vit A).
- Medicinal properties recognized but rarely studied for phytonutrients

The Spider plant: an orphan crop?

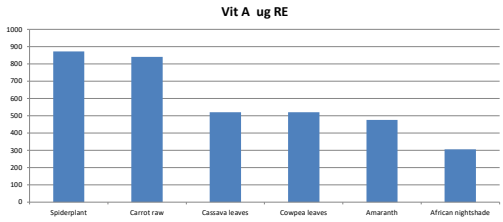
Home garden crop in the past, the plant is now cultivated in urban agriculture

The Spider plant: no orphan crop

- Fresh leaf sold in open markets in local communities and in supermarkets in Nairobi
- Source of income and usually more expensive than other commonly used vegetables like *Amaranthus*
- Dry leaf sold to add value and mitigate short shelf life

Cleome is mostly used with Ugali (sima), rice, akunmey, banku, tô, …

Vegetables rich in B-carotene (pro- vitamin A)



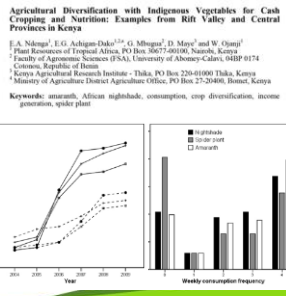
- **Source?**

The need for cultivar improvement

- Survey in Kenya showed a scope for increased production as a result of high demand;
- C_4 plant, with efficient use of available CO_2 and water : climate change adaptation
- leaf yields generally low, mainly due to limited access by farmers to improved cultivars
- farmers need cultivars for drought tolerance, high yield and nutritional composition, high seed germination rate.

Knowledge co-creation

- **Proposal development**
  - Scientific consultation
  - Interaction with communities
  - Statistics gathering


Agricultural Diversification with Indigenous Vegetables for Cash Cropping and Nutrition: Examples from Rift Valley and Central Provinces in Kenya

[E.A. Ndenga[1], E.G. Achigan-Dako[1,2,3], G. Mbugua[2], D. Maye[3] and W. Ojanji[4]
[1] Plant Resources of Tropical Africa, PO Box 30677-00100, Nairobi, Kenya
[2] Faculty of Agronomic Sciences (FSA), University of Abomey-Calavi, 04BP 0174 Cotonou, Republic of Benin
[3] Kenya Agricultural Research Institute - Thika, PO Box 220-01000 Thika, Kenya
[4] Ministry of Agriculture District Agriculture Office, PO Box 27-20400, Bomet, Kenya

Keywords: amaranth, African nightshade, consumption, crop diversification, income generation, spider plant

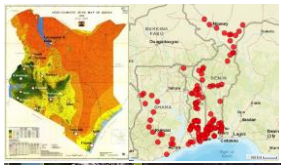
Knowledge co-creation

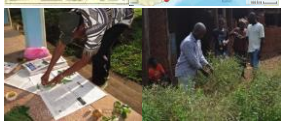
- Inception meeting
  - Field visits
  - Farmers participation
  - Revisit project goals

Knowledge co-creation

- Project implementation
  - Field visits
  - Anticipating on farmers preferences and appreciation
  - Producers and consumers opinions count!

Produce science based-evidence





- Prospection and collection of genetic resources from West Africa and East Africa
- Accession assembly from AVRDC (48)
- Passport data development
- Ethnobotanical studies

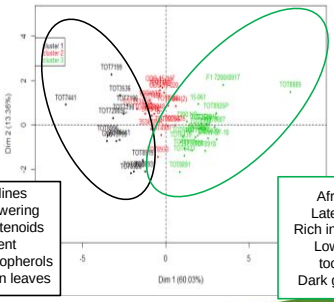
Science based evidence

Phenotyping of 100 accessions collected worldwide

Science-based evidence

Metabolic analyses

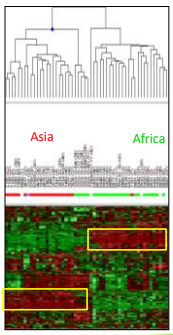
PCA based on carotenoids, tocopherols and flowering time in *Cleome gynandra*



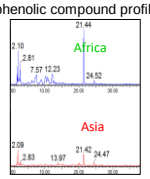
Asian lines
Early flowering
Low carotenoids content
Rich in tocopherols
Light green leaves

African lines
Late flowering
Rich in carotenoids
Low levels of tocopherols
Dark green leaves

Origin specific pathways



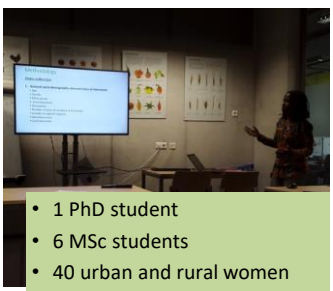
phenolic compound profiles



phenolic compounds

other phenolic compounds

Capacity building



- 1 PhD student
- 6 MSc students
- 40 urban and rural women and men producers

Lessons learnt and way forward

- Diversity of utilizations of the species (recipes, medicinal uses)
- Production constraints: seed germination, pests and diseases
- Variation in metabolic profiles: vitamins A and E, phenolic compounds
- Existence of a high demand in urban markets (consumers' surveys, demonstration plots at FSA)
- Development of germination protocols for farmers/breeders
- Farmers' field schools for best production practices
- Knowledge dissemination (factsheets, fairs, advertisements)
- Field screening for drought tolerance
- Testing nutrient-rich and high yielding lines with farmers

Thank you!

Horticulture and Genetics Unit/Faculty of Agronomic Sciences (UAC)