Improving Nutrition and Income Generation with African Indigenous Vegetables: Selected Lessons Learned

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Obj. 1 Hypothesis: Appropriate interventions can increase access to and consumption of AIVs among producers & consumers in Kenya & Zambia.

Lesson 1. Developing & identifying the most effective intervention methods toward improved access, affordability, availability, and adoption of AIVs must be based on solid survey consumer data

Pilot survey's conducted indicated:
1. AIVs very popular- but not consumed regularly!
2. Kenya's and Zambians would opt to consume AIVs (at greater frequency and quantities) but don't due to issues of access, affordability, availability, with many unaware of their nutritional benefit.
3. Preference for specific AIVs and their popularity drives our R&D.

| AIV	Rarely	Sometimes	Everyday
Green Maize (fresh)	66.7	29.4	3.9
Amaranth	24.1	**69.0**	**6.9**
Nightshade	46.2	**53.8**	0
Spider Plant	39.1	**60.9**	0
Cowpea	59.1	**40.9**	0
Jute Mallow	23.1	**76.9**	0
Kale	26.1	**69.6**	**4.3**
Sweet potato leaves	28.6	**71.4**	0
Orange sweet potato	64.3	**35.7**	0
Okra	26.9	**73.1**	0
Ethiopian mustard	35.3	**64.7**	0
African eggplant	41.4	**58.6**	0
Other AIVs	28.6	**71.4**	0

Women's Dietary Diversity

Lessons Learned from Pilot Study in Kenya and Zambia

- Collected data on household consumption and dietary diversity.

- Data were used to inform subsequent baseline data collection conducted in 2016

Average score of WDD was below 5, indicating low dietary diversity

WDD is a robust outcome that will allow for differentiation between groups studied in 2017 and 2018.
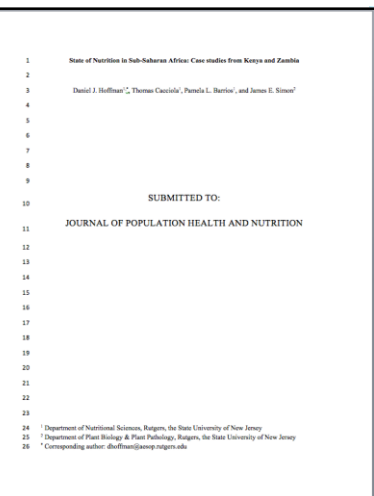
Consumer Surveys to compare effect of production and nutrition-education interventions

50 pilot survey of households in Kenya and Zambia were completed to guide our larger one.
500 households with at least one woman of childbearing age and at least one child were surveyed in both Kenya and Zambia in 2016 to evaluate baseline AIV consumption in communities prior to intervention activities.
125 households will now either be provided with: (T1) Nutrition education intervention activities; (T2) Production intervention activities; (T3) Both types of intervention activities; and (T4) A Control group treatment

Quadrate 1- CONTROL GROUP- They are found in similar exposure and knowledge on AIVs AIV production sites - Will NOT be given any intervention -*Being monitored on nutritional aspects * Suitable Site selected: TRANS NZOIA	**Quadrate 3- TREATED GROUP- they are found in similar exposure and knowledge on AIVs AIV production sites** - They will be give behavioral change communication as an intervention *Being monitored on nutritional aspects * Suitable Site selected: BUNGOMA
Quadrate 2- CONTROL GROUP- They are found in similar exposure and knowledge on AIVs AIV production sites - ONLY PRODUCTION intervention will be given to the populace of the region *Being monitored on nutritional aspects* Suitable Site selected: KISUMU/NANDI	**Quadrate 4- TREATED GROUP- They are found in similar exposure and knowledge on AIVs AIV production sites** - Will be given both PRODUCTION SKILLS and BEHAVIORAL CHANGE COMMUNICATION *Being monitored on nutritional aspects* Suitable Site selected: BUSIA

Follow-up consumption surveys to be conducted following intervention activities to quantitatively evaluate the effect of each intervention approach.

Sites of Surveys and Interventions in Zambia and Kenya

Status of African Indigenous Vegetables in Zambia: Baseline Production Survey and Analysis

May 2016

Lesson 2: *98.8%* producers want access to better management practices, technology and pest management

Obj. 2: Hypothesis: Appropriate promotion and expansion of availability of AIVs at the local level will strengthen market access and sales for producers of AIVs:

In each Zambia and Kenya, <u>300 AIV producers and 75 intermediaries were surveyed</u> to identify the most substantial bottlenecks in productivity to guide the focus of production interventions.

Lesson 3: Growers report AIV requires same level of management and skills as vegetables and report difficulties in: *Access to seeds and plant materials; unaware of improved germplasm; identification of problems with some current AIVs; high price of fertilizers and farm credit limiting, and insect problematic with a few AIVs. **75% of producers cant access credit** (agric. inputs after medical bills identified as primary use of credit)

A vast majority (88%) of the respondents felt that there was no difference in overall farming experience between the production and sale of AIVs compared to other vegetable (Table 3.6.5).

Table 3.6.5: Existence of difference between production and sale of AIVs

S.NO	Particulars	Frequency	Percent
1.	No	256	88
2.	Yes	35	12
	Total	291	100

The respondents attributed their willingness to pay a premium (Figure 3.6.7) for certain improved characteristics like healthiness (50%), hygiene (23%), taste (6%), and organically produced AIVs (21%) if they were to buy their AIVs in the market.

Figure 3.6.7: Willing to pay (WTP) a Premium Price
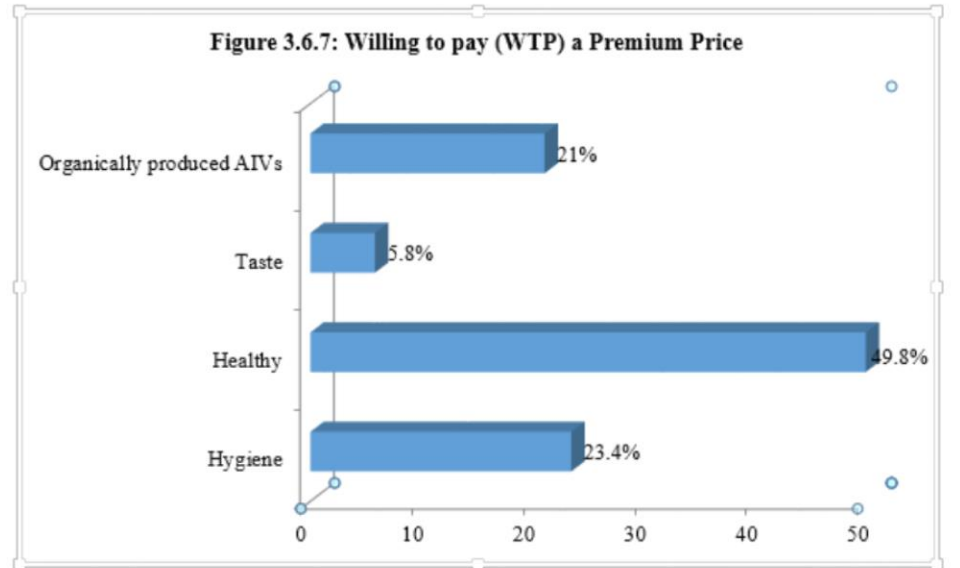
Amongst the respondents, about 61% had sold AIVs in the past 2 years (Table 3.6.6). Orange sweet potato ranked first at 318 kg in terms of quantity sold (Table 3.6.7) in the last completed

The buyers were also asked to rank their preferences in characteristics that they look for when they buy AIVs (Table 3.6.18). Appearance (34%) and freshness (18.4%) were ranked the most for amaranth. These two characteristics were ranked at 36% each for nightshade, at 29% and 20% for spider plant. It was nutritive quality (31%) and freshness (8%) for cowpea. Appearance (19%) and marketability (11%) topped the list for jute mallow, and for kale it was 27% and 13% respectively. Appearance (34%) and tolerance towards diseases and pests (8%) topped the list for sweet potato leaves. Nutritive quality (24%) and appearance (17%) topped the list for orange sweet potato and it was freshness (30%) and appearance (20%) for okra. In general the top two characteristics that the buyers look for when they buy AIVs is appearance and freshness.
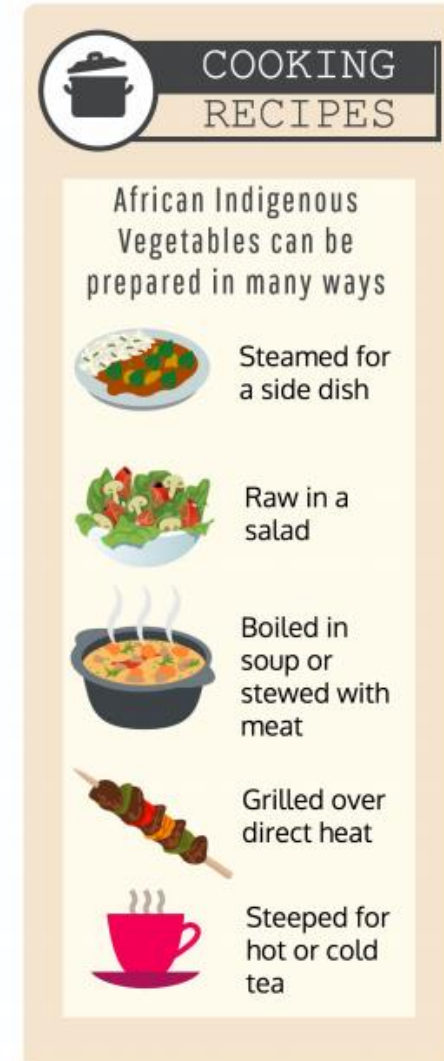
Nutrition Education Intervention (BCC)

500 Individuals in Kenya and Zambia will be provided with on-going nutrition education trainings (BCC):

- **Nutrition content of AIVs**
- **Recommended intake amount**
- **Health Applications**
- **Recipes and meal preparations**

Lesson 4 Learned: Parents, grandparents and even school teachers far more excited about AIVs when they understand their nutritional content! Source of pride, source of tradition, easy to collect yet still perceived to be wild harvested not cultivated and *"undervalued"*.

Your Plate

Fruits · Grains · Dairy · Vegetables · Protein

VEGETABLES · FRUITS · PROTEIN · GRAINS · DAIRY

2 in 8 People Are Eating The Recommended Amount of Vegetables

Lets Eat

Vegetables

A GUIDE TO EATING HEALTHY

Increasing Vegetable Consumption Leads to Improved Overall Health

Health Icons

Eating locally sourced vegetables is just one way to promote a healthy lifestyle and has numerous benefits

COOKING RECIPES

African Indigenous Vegetables can be prepared in many ways

- Steamed for a side dish
- Raw in a salad
- Boiled in soup or stewed with meat
- Grilled over direct heat
- Steeped for hot or cold tea

Obj. 3. Determine best management practices for AIV production, increase capacity and access to AIVs

Participatory research prioritized by survey results to provide accurate information and recommendations for farmers

- Cultural practices
- Management technologies
- Improved seed & storage
- Integrated pest management
- Irrigation and drought tolerance

Lesson 5: *90.9%* producers ant better AIV seed quality.

Lesson 6: 75% of producers want training for production during dry seasons & drought.

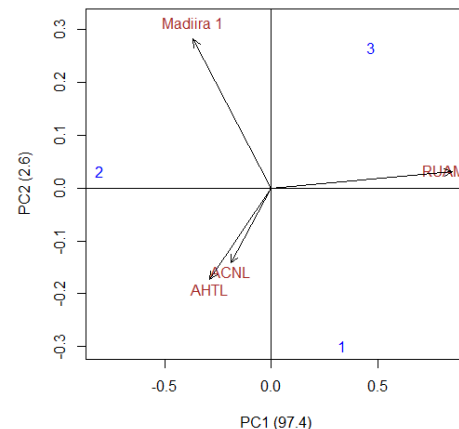Common pests and diseases of amaranth, nightshade and spider plant in East Africa

Solar Dryer < $100 to build

Obj. 4. Evaluation of nutrient composition of AIVs:

Determining the content and stability of micronutrients in AIVs

Lesson 8: Many of the AIVs are Nutrient rich and can be submitted to USDA for inclusion.

Result: Spiderplant flower rapidly ca. 1 month field limiting production. We then screened populations for photoperiodicity. **In 2016 we identified spiderplants that remain vegetative for >6 months, and now field testing. This could be transformative!**

AMMI results

	Fe	Ca	Mg	Zn	Total Yield	Height	Spread
Env	<.0001	0.0009	<.0001	<.0001	<.0001	<.0001	<.0001
rep(env)	0.6617	0.264	0.0194	0.0113	0.045	0.0453	0.0001
Gen	<.0001	0.002	0.0366	0.004	<.0001	<.0001	0.0004
env*gen	0.0004	0.0009	0.0624	0.3097	0.0085	0.0035	0.088

Results of additive main effects and multiplicative interaction effect (AMMI) analysis of the four accessions which were grown in common across the three environments: PI 674263, AC-NL, AH-TL, and Madiira 1.

Lesson 7: Selection and breeding for micronutrients possible.
2017. Brynes, D., F. Dinssa, S. Weller and J.E. Simon. Elemental micronutrient content and horticultural performance of vegetable amaranth types. JASHS: (in press).
Result: A new high Fe Amaranth being developed by us with new variety release expected in 2017/2018.

Increasing Access: Peri-Urban; Urban, Schools

Evaluating Sack-Gardens: Tumaini Center for Street Boys, Kenya

Lesson 9: Linking to Youth by providing training in AIV production, can create entry point to new generation, urban settings and reach more families for accessing fresh healthy produce and possible new income generation opportunities

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