Nutrient Concentration of Anchote (*Coccinia abyssinica*) Plant Parts at Different Harvesting Dates and In-situ Storage

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Outline

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Root and Tuber Crops

- Contribute substantial part of the world's food supply
- Staple food source, has significant share in food security, in tradition and food culture of diversified societies of Ethiopia( )
- Prominent among these are: Potato, (*Solanum tuberosum L.)*, sweet potato *(Ipomoea batatas L.)*, enset (*Ensete ventricosum (Welw), Cheesman)*, godere *(Colacasia esculanta L.)*, yams (*Dioscorea spp.)*, Ethiopian dinch *(Coleus parviflorus)*, koteharrie *(Diaspora bulbiferous)*, *and* **anchote *(Coccinia abyssinica).***

Among these, enset, anchote, and some yams are endemic to Ethiopia

Anchote plant







Taken by Dereje

Anchote [*Coccinia abyssinica* (Lam.) Cogn.]

- Locally known as Anchote (Afan Oromo language)
- Cucurbitaceae family, annual trailing vine
- long-stayed on the farmers' hand
- Mainly cultivated for its tuberous fleshy root

- Around 8 Coccinia species reported to exist in Ethiopia
- Only *C. abyssinica* is cultivated for human consumption (Hora, 1995).
- Propagated by vegetative part and seeds
- The plant dies after the fruit have matured.
- The underground tubers produce new shoots at the onset of the wet season
- Anchote is cultivated in areas with
  - 1300-2800 m above sea level
  - annual rainfall ranges between 762-1016 mm (Amare, 1973).
- Currently Produced on 6526 ha by 45, 232 farmers and an average yield of 5.8 t ha^{-1} (MOA)

What is special of anchote?

- Propagation is by seeds
- No disease was recorded on tubers
- Storability in-situ
- Can be produced with minimal inputs
  - low soil fertility
  - acidic soils
  - Tolerate drought and
  - Under intercropping with cereals

Use

- As food (mainly tuber roots) and medicines for human
- significant contributions towards food security, income generation, provision of food energy, important role in the diet of the inhabitants
- Its tuberous root is used as a cultural food in western part of Ethiopia, during the finding of true cross
- Served as special food in restaurant and hotel in western part of the country
- As feeds for animal

1.2 Statement of problem

- Anchote has not yet been fully exploited and utilized despite its significant contributions in tradition and food vale
- There has been insufficient study of their nutritional value
- Traditionally farmers use in-situ stored anchote tuberous roots for medicinal purposes with the hypothesis of increasing its nutrient concentration over time. This hypothesis is not scientifically confirmed and detail nutritional information is not generated. Before further breeding and promotion of the crop for wider cultivation and utilization we wanted to see nutritional aspects of it.

Objective:

- This study was initiated for testing farmers' hypothesis, through investigating the selected nutrient contents of Anchote as affected by harvesting dates and in-situ storage.

2. Methodology

- Field study was conducted at HU FRC under both rain fed and irrigated conditions.
- CRBD with five treatment and three replication
- Planting: local anchote seeds
- 15 plots with 2.5 m x 2.2 m in size
- Two *anchote* seeds was planted per hole at spacing of 0.50 m x 0.20 cm, b/n rows and plant respectively
- Fertilization:
  - 20 kg P ha^{-1} in the form of DAP
  - 46 kg N ha^{-1} in the form of urea

Data Management and Analysis

We collected data on different variables

- Growth performance and yield parameter such as Fresh above ground biomass (FAB), Fresh and Dry Tuber Yield (FTY and DTY), Average Tuber Weight (ATW), Fresh and Dry Root Yield (FRY and DRY)

- Nutrient composition within the different plant parts (tuber, leaf, roots) at different harvesting date (4^{th} , 7^{th} , 10^{th} , 13^{th} , 16^{th}) was determined using standard laboratory

Nutrient Analysis

- ILRI-Ethiopia Analytical Services Laboratory was used for nutrient content determination

Data Analysis

- The data collected were analyzed using MINI Tab 14 software package
- Mean significance differences among treatments were declared at 5% probability level.

Results and discussion

- Anchote growth performances and yield were significantly affected by date of harvesting
- Result shows extending harvesting dates to 7 month increases tuber fresh and dry weight per ha

Table 1. Anchote tuberous root yield, above ground biomass yield and root yield as affected by harvesting date

Harvesting date*	FTY (t ha^{-1})	DTY (t ha^{-1})	ATW (g)	FAB (t ha^{-1})	DAB (t ha^{-1})	FRY (kg ha^{-1})	DRY (kg ha^{-1})
4	3.5C	0.72C	90B	66.7A	8.2A	363.6B	0.26B
7	19.2A	3.96A	334A	4.2D	0.5C	1121.2A	0.50A
10	17.6AB	3.65A	313A	3.5D	0.7C	1064.3B	0.27B
13	15.5B	2.69B	309A	7.9A	1.7B	539.4B	0.24B
16	15.9B	2.76B	267A	13.0B	2.1B	600.0B	0.30B
Prob.	0.0001	0.0001	0.001	0.0001	0.0001	0.023	0.0001

Table 4. Anchote tuber nutrient concentrations as affected by harvesting dates

Harvesting date*	N%	CP%	P%	K%	Ca%	Fe (ppm)	OM (%)	Ash (%)
4	1.5B	9.6B	0.74AB	1.41	0.44	219.2B	93.8B	6.2A
7	2.1A	13.4A	0.58B	1.32	0.51	382.8AB	95.0A	5.0B
10	2.2A	13.8A	0.77AB	1.43	0.47	440.5A	93.8B	6.2A
13	2.0A	12.3A	0.85A	1.53	0.60	401.8AB	93.0B	7.0A
Prob.	0.001	0.002	0.023	0.423	0.278	0.049	0.005	0.001

- We observed siginificant diffrenece in response of mineral nutrients concentrations in tuber to harvesting date

- Maximum P, Ca, K mineral concentration was observed when crops harvested at 13 months , this particulary confirms farmers indegeneous knowledge

Nutrient concentrations in *anchote* tuberour root as compared to tuber /root of cassava, Potato and Yam

Nutrient Element	cassava	Yam	Potato	Anchote
	Concentration (g/kg) of dry tuber			
N			15	19
K			20	122.6
P	3.9		2.4	7.4
Ca	0,9	0.45	0.78	5.1
Fe	**0.**184	0.15	75.2	0.316

Table 2. Anchote leaf nutrient concentrations as affected by harvesting date

Harvesting date *	N%	CP %	P%	K%	Ca%	Fe (ppm)	OM (%)	Ash (%)
4	4.6	28.4	0.81	3.9A	2.2B	293.6C	82.4A	17.6C
7	4.2	26.3	0.52	3.1AB	3.5A	2709.9A	72.7C	27.3A
10	4.2	26.4	0.84	2.6B	3.6A	1190.9B	76.4B	23.6B
13	3.7	22.9	0.73	2.6B	2.7B	958.5B	80.1A	19.9C
Prob.	0.072	0.071	0.502	0.006	0.009	0.0001	0.0001	0.0001

- No siginificant difference was observed in N, CP, P mineral nutrient concentration in the leaf harvested at different times
- Higher N, K and CP was obtained in anchote leaf at 4th months
- Max P and Ca was exhibited at 10th months

Nutrient concentration in anchote leaf as compared to other edable leaf veratables

	C ucumber	Swiss chard	Anchote
Nutrient element	concentration (g/kg) leaves		
N	56		**41.75**
K	45	25.5	**30.5**
P	9		**7.25**
Ca	24	7.8	**30**
Fe	3	0.288	**1.29**
Protein	284	322.5	**260**
Ash	176	176.2	**221**

Conclusion

- Extending anchote harvesting date and in-situ storage had increased yield and nutrient contents which confirmed farmers hypothesis
- Comparable to other root crops anchote plant tuber and leaf contains valuable nutrient
- Anchote leaf nutrient contents is higher than that is found in anchote tuberous , further research must be conducted to test antinational factor in anchote leaf and promote the use of the leaf for feeds and food value.

Policy implication and recomendation

- Anchote should be promoted for wider cultivation and consumption for human and possibly for livestock
- Indigenous knowledge should be documented
- Product development for the crop should be given due attention

THANK YOU FOR YOUR ATTENTION