

## Catalogue of Selected Indigenous Vegetables in Ghana

Report



September, 2020

University for Development Studies in collaboration with HortiFresh WA



Kingdom of the Netherlands



WAGENINGEN  
UNIVERSITY & RESEARCH



This catalogue is the product of team work with contribution from the authors whose names are listed below:

**Francis Kweku Amagloh**

*HoD, Department of Food Science and Technology*

E-mail: [fkamagloh@uds.edu.gh](mailto:fkamagloh@uds.edu.gh)

**Gustav Komla Mahunu**

*Senior Lecturer, Department of Food Science and Technology*

E-mail: [gmahunu@uds.edu.gh](mailto:gmahunu@uds.edu.gh)

**Linda Dari**

*Senior Lecturer, Department of Food Science and Technology*

E-mail: [ldari@uds.edu.gh](mailto:ldari@uds.edu.gh)

**Mildred Osei-Kwarteng**

*Lecturer, Department of Horticulture*

E-mail: [osei.kwarteng@uds.edu.gh](mailto:osei.kwarteng@uds.edu.gh)

**Richard Atinpoore Atuna**

*Lecturer, Department of Food Science and Technology*

E-mail: [ratuna@uds.edu.gh](mailto:ratuna@uds.edu.gh)

**Matthew Atongbiik Achaglinkame**

*Senior Research Assistant, Dept. of Agric Mechanization & Irrigation Tech*

E-mail: [maachaglinkame@gmail.com](mailto:maachaglinkame@gmail.com)

In collaboration with:

**Sanne Bakker**

*Food and Nutrition Security Advisor at Wageningen Centre for Development Innovation*

E-mail: [sanne.bakker@wur.nl](mailto:sanne.bakker@wur.nl)

**Jemima Djah**

*Agronomist Advisor, SNV, HortiFresh*

E-mail: [jdjah@snv.org](mailto:jdjah@snv.org)

**Irene Koomen**

*Senior advisor at Wageningen Centre for Development Innovation and Coordinator of the HortiFresh programme*

E-mail: [irene.koomen@wur.nl](mailto:irene.koomen@wur.nl)

This catalogue was prepared following the findings of HortiFresh Research into the nutritional value of some indigenous vegetables in Ghana.

Some cover photos are from <https://pixabay.com/>.

---

# Table of Contents

Foreword	2
African eggplant fruits (white, aubergine and Ethiopian eggplant)	3
African eggplant leaf	4
Amaranth	5
Baobab leaves	6
Bean leaves	7
Cocoyam leaves	8
Jute mallow	9
Kenaf	10
Moringa leaves	11
Okra	12
Pumpkin	13
Roselle	14
Sponge gourd	15
Sweet potato leaves	16
Turkey berry	17
West Indian nettle	18
References	19

## Foreword

In the International Year of Fruits and Vegetables I am delighted to highlight the importance of indigenous vegetables. This Catalogue for Selected Indigenous vegetables presents a great opportunity to the Ghanaian community, an in-depth knowledge into available indigenous vegetables across all regions of Ghana. Eating vegetables frequently, even in limited quantities, is beneficial to one's health and well-being.

Unfortunately, average fruit and vegetable consumption among Ghanaians is far below the WHO/FAO 400 g recommended intake levels. In Ghana, both wild and cultivated indigenous vegetables are used for consumption. However, most people incline to patronize cultivated exotic vegetables which are often more expensive than the indigenous ones. The nutrition content of local Ghanaian and other indigenous African vegetables are superior or similar to some exotic types. The indigenous vegetables are a vital constituent of the West African diet, but underutilized and have limited documented research<sup>1</sup>.

In this light, promoting consumption of indigenous vegetables among Ghanaians is key to improving the health of many. This is why the HortiFresh program, which is funded by the Netherlands government, in close collaboration with researchers from the University for Development Studies set out to map the consumption patterns of indigenous vegetables across all regions in Ghana<sup>2</sup>. The study identified a selection of indigenous nutritious vegetables which are key to nutrition security and appreciated widely among Ghanaians.

Ron Strikker  
Netherlands Ambassador to Ghana



This catalogue compiles information on nutrition and health benefits of the selected indigenous vegetables as well as agronomic tips on propagation, spacing, fertilizer, irrigation and expected yield. It provides a key tool for partners in the horticulture sector and other development practitioners to include indigenous vegetables in their activities. Apart from promoting good health when indigenous vegetables are consumed, increased consumption of African indigenous vegetables will help to enhance crop diversity, alleviate poverty and promote food security.

I am hopeful readers and Ghanaians in general will appreciate the content of this research which will go a long way to improve their knowledge of and increase the consumption of indigenous vegetables.

I strongly recommend that you make good use of this research the HortiFresh program has put together. Let us build a healthy society with indigenous vegetables together!

<sup>1</sup> Abbey L., Bonsu K.O., Glover A.M., Ahenkora K. (2006) Evaluation of some common leafy vegetables used in Ghana Crop Research Institute, Kumasi. *Ghana Journal of Horticulture* 5: 23.

<sup>2</sup> Atuna R.A., Djah J., Achanglikame M.A., Bakker S. Dari L., Osei-Kwarteng M., Mahunu G.K., Koomen I., Amagloh F.K. (2019) *Distribution and consumption patterns of indigenous vegetables in Ghana.*

## African eggplant fruits (white, aubergine and Ethiopian eggplant)

African eggplant/Aubergine (*Solanum melongena*), "Ntoropo" and Ethiopian eggplant (*Solanum aethiopicum*), "Nyaadowa" are widely consumed in all the regions of Ghana.

### Nutritional/health benefits

- African eggplant fruit is more outstanding in potassium, beta-carotene and folate.
- Its high potassium (K) content makes it a good source for strong and healthy bones and teeth.
- Beta-carotene, pro-vitamin A, promotes eye health and also serves as an antioxidant.
- Folate is very essential for the production of blood cells, DNA and RNA.

### Agronomic tips

#### Propagation

Propagation of African eggplant is by seed. The crop performs best in well-drained light sandy loam/heavy clay soils with a pH of 5.5–6.8 and a temperature of about 25–35 °C (day) and 20–27 °C (night) Spacing: 20–30 cm within rows and 60–75 cm between rows.

#### Fertiliser

Apply 10–20 t/ha farm or poultry manure or 150 kg/ha of NPK 15:15:15 or 10:10:20 at 10 days after transplanting and 50 kg/ha at first flowering and subsequently at monthly intervals. When grown as leafy vegetables, apply a top dressing of N as NPK 15:15:15 at a rate 50 kg/ha at every two weeks.

#### Irrigation

Irrigate at 5 mm/day/plant.

#### Yield

Without irrigation, crop yield of 5–8 t/ha can be obtained while when irrigated, yields of 12–20 t/ha are attainable. For improved cultivars cultivated under favourable growth conditions yields of 50–80 t/ha can be obtained.



Eggplant "Ntoropo" (top left), "Muma" (top right), "Ansurowia" (down left), "Kombiori" (down right) fruits

### Nutrition content of African eggplant in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	32	Ca (mg)	12	Vit A-RAE (mcg)	11
Water (g)	89.8	Fe (mg)	1.1	β-carotene equivalent (mcg)	131
Protein (g)	1.3	Mg (mg)	24	Vit E (mg)	0.09
Fat (g)	0.4	P (mg)	29	Thiamin (mg)	0.07
Carb (g)	3.9	K (mg)	239	Riboflavin (mg)	0.11
Fibre (g)	4.0	Na (mg)	4.0	Niacin (mg)	0.6
Ash (g)	0.6	Zn (mg)	0.23	Vit B6 (mg)	0.06
		Cu (mg)	0.13	Folate (mcg)	33
				Vit C (mg)	2

#### Consumption

Fruits of the african eggplant are used in the preparation of soups and stews, which are eaten with starch-based staples.

# African eggplant leaf

African eggplant (*Solanum macrocarpon*) leaf, “Gboma” is consumed all over Ghana but is consumed widely and more in Ahafo, Ashanti, Bono, Bono East, Eastern, Oti, Volta, Central, Greater Accra, Western and Western North regions of Ghana. It is consumed by all categories of people in all age groups.

Garden eggs are consumed by all categories of people in all age groups.

## Nutritional/health benefits

- Per the nutrient content table, African eggplant leaves are more dominant in phosphorus and potassium.
- Phosphorus promotes bones and teeth health and helps in muscle contraction and recovery.

## Agronomic tips

### Propagation

The crop is cultivated by seed. Before sowing, pre-soak seeds in hydrogen peroxide to improve germination. The crop thrives better in well-drained deep soils with an optimum average monthly temperature of 20–31 °C and pH of 6–6.8.

### Spacing

Sow seeds in the nursery at a spacing of 20 cm between rows. Transplant seedlings at 50 cm × 50 cm (optimum leaf yield is obtained at this spacing).

### Fertiliser

The crop responds well to inorganic fertiliser and organic manure. At bed preparation, apply 80–100 kg/ha NPK 15-15-15. The optimum application of fertiliser is based on the initial fertility of the soil. Hence contrasting optimum rates (e.g. 150 kg/ha and 400 kg/ha) have been found by different investigators.



African egg plant “Gboma” leaves and fruits (in circle)

### Irrigation

Mean annual rainfall of 700–1000 mm.

### Yield

An average yield of 2.9 kg/m<sup>2</sup> can be obtained.

### Nutrition content of African eggplant leaves in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	48	Ca (mg)	332	Vit A-RAE (mcg)	297
Water (g)	85.3	Fe (mg)	4.3	β-carotene equivalent (mcg)	3,560
Protein (g)	4.4	Mg (mg)	81	Vit E (mg)	0.42
Fat (g)	0.8	P (mg)	44	Thiamin (mg)	0.08
Carb (g)	3.7	K (mg)	443	Riboflavin (mg)	0.17
Fibre (g)	4.2	Na (mg)	26	Niacin (mg)	0.7
Ash (g)	1.7	Zn (mg)	0.73	Vit B6 (mg)	0.29
		Cu (mg)	0.21	Folate (mcg)	69
				Vit C (mg)	69

#### Consumption

The leaves are used in stews, soups and side dishes. They are often eaten with corn, millet and cassava-based staples.

# Amaranth

Amaranth (*Amaranthus* spp. L.), “Alefu”/“Efan” is widely eaten in the Bono and northern parts of Ghana.

## Nutritional/health benefits

- Amaranth leaves contain relatively higher amounts of calcium, magnesium, phosphorus potassium, vitamins A and C, beta-carotene, folate and proteins.
- Vitamin C helps to boost immunity and improve iron absorption.

## Agronomic tips

### Propagation

Amaranth is propagated by seeds. Performs best in well-drained fertile soils with a pH of 5.5–7.5 (optimum pH is 6.5) and a temperature of 18–32 °C. Sow seeds in a nursery at a seed rate of 3–10 g/m<sup>2</sup> and transplant at 2–3 weeks after sowing. Direct sowing can be done at a rate of 2–5 g/m<sup>2</sup>.

### Spacing

Plants can be densely spaced at 5–10 cm or less densely at 15–30 cm within rows or at 30 cm × 30 cm. A plant density of 25 plants/m<sup>2</sup> is recommended for repeated cuttings and 100–200 kg/m<sup>2</sup> for harvesting at once. The recommended optimum spacing for harvesting at once is 10 cm × 10 cm while 20 cm × 20 cm is for repeated cuttings.

### Fertiliser

Amaranths respond well to organic fertiliser and nitrogen. To achieve a yield of 25 t/ha, the crop should be supplied with 125 kg N, 25 kg P, 250 kg K, 75 kg Ca and 40 kg Mg. Larger amounts of N and K are a luxury for the crop. On poor soils, apply 400 kg/ha NPK (10:20:10) plus 25 t/ha of organic manure. A split application is recommended in the rainy season. A 2–4 t/1000 m<sup>2</sup> organic matter is recommended. Amaranths respond better to nitrate N than ammonium N. 135 kg/ha N; poor soils = 250 kg/ha of NPK 10–10–20 in addition to 25 t/ha of organic manure.



Amaranth plant, leaves (in circle)

### Irrigation

6 mm/m<sup>2</sup>.

### Yield

Maximum yield of 3 kg/m<sup>2</sup> but the yield of the first cutting of a ratooned crop is 1.0–1.5 kg/m<sup>2</sup>. Shoot yield of 30–40 t/ha is also attainable.

### Nutrition content of Amaranth leaves in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	40	Ca (mg)	368	Vit A-RAE (mcg)	225
Water (g)	85.6	Fe (mg)	7.2	β-carotene equivalent (mcg)	2,710
Protein (g)	4.1	Mg (mg)	160	Vit E (mg)	0.44
Fat (g)	0.4	P (mg)	69	Thiamin (mg)	0.05
Carb (g)	3.0	K (mg)	545	Riboflavin (mg)	0.19
Fibre (g)	3.8	Na (mg)	7	Niacin (mg)	0.7
Ash (g)	3.0	Zn (mg)	0.66	Vit B6 (mg)	0.21
		Cu (mg)	0.29	Folate (mcg)	76
				Vit C (mg)	67

#### Consumption

It is used in the preparation of soups and eaten with millet, corn and cassava staples.

## Baobab leaves

Baobab leaves (*Adansonia digitata*), "Tokara"/"Nufoten". The leaves are largely consumed in the Bono and northern parts of Ghana.

### Nutritional/health benefits

- Baobab leaves have relatively higher amounts of calcium, magnesium, phosphorus potassium, vitamins A and C, beta-carotene and folate as compared to the other nutrients. Its fibre content is also relatively higher as compared to its protein, fat and carbohydrate contents.

### Agronomic tips

#### Propagation

The crop can be propagated by seeds and stem cuttings. Pre-treat seeds by cracking or immersing seeds in boiled water for 5–7 min. The crop performs best in well-drained acidic (<6.5) sandy soil with underlying loamy soils and an average daily temperature of 19–35 °C (20–30 °C annual) Spacing: transplant seedlings at the onset of the rains at a spacing of 10 m × 10 m.

#### Fertiliser

Mature trees can do without fertiliser but young plants should be fertilised with potassium-rich liquid fertiliser. Potted plants can also be fertilised at a rate of 10 t/ha (226.8 g/plot) of animal manure (cowdung>poultry>sheep) which resulted in a higher leaf yield than 200 kg/ha of NPK 15:15:15 (11.5 g/pot) and the control (Husseini et al., 2016).

#### Irrigation

It is common in areas with annual rainfall of 300–800 mm.

#### Yield

No data is available on leaf or fibre yield of baobab in literature.



Baobab plants (top), leaves (down)

#### Nutrition content of Baobab leaves in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 62	Ca (mg) 313	Vit A-RAE (mcg) 213
Water (g) 76.7	Fe (mg) 3.5	β-carotene equivalent (mcg) 2,558
Protein (g) 3.9	Mg (mg) 52	Vit E (mg) 0.42
Fat (g) 0.4	P (mg) 85	Thiamin (mg) 0.03
Carb (g) 5.4	K (mg) 376	Riboflavin (mg) 0.04
Fibre (g) 10.8	Na (mg) 42	Niacin (mg) 0.7
Ash (g) 2.8	Zn (mg) 0.90	Vit B6 (mg) 0.4
	Cu (mg) 0.18	Folate (mcg) 97
		Vit C (mg) 47

#### Consumption

The leaves, either fresh or dried, are prepared into soups and stews that is eaten with starch-based staples.

## Bean leaves

Runner bean (*Phaseolus coccineus*), Cowpea (*Vigna unguiculata*), "Adua ahahan" are largely consumed in the Bono and northern parts of Ghana.

### Nutritional/health benefits

- Cowpea leaves are a better source of protein, calcium, potassium, vitamins A and C, beta-carotene and folate as compared to the other nutrients in the various compositional categories.

### Agronomic tips

#### Propagation

Propagation is by seed. The bean plant prefers a temperature of 25–35 °C (opt. 30 °C), well-drained soil with a pH of 5.5–7.5. The field should be prepared to a fine tilth. Sow seeds in rows on raised beds incorporated with manure. Cultivate plants on seed beds to encourage good drainage, easy surface irrigation, staking and harvesting.

#### Spacing

Erect type of cultivars are spaced at 10 cm × 50–100 cm / 50 cm × 50–60 cm (hill planting) or 15 cm × 35 cm and 75 cm × 75 cm for prostrate indeterminate types.

#### Fertiliser

The crop requires phosphorus for nodulation and root growth. Incorporate 25 kg/ha each of P and K in phosphorus and potassium deficient soils. The mineral uptake of vegetable cowpea or yard-long bean is high; apply 5–10 t/ha of farmyard manure in addition to 20 kg/ha N, 25 kg/ha K and 40 kg/ha P during soil preparation. Then at three weeks after emergence, top dress with 50 kg/ha urea.

#### Irrigation

500–1500 mm annual rainfall & 6–8 mm/day (matured crop).



Bean leaves: Runner, Cowpea (in circle)

#### Yield

400 kg/ha of cowpea leaves can be harvested with no significant reduction of seed yield.

#### Nutrition content of Bean leaves in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 42	Ca (mg) 265	Vit A-RAE (mcg) 150
Water (g) 86.6	Fe (mg) 5.1	β-carotene equivalent (mcg) 1,800
Protein (g) 4.2	Mg (mg) 60	Vit E (mg) 2.36
Fat (g) 0.3	P (mg) 61	Thiamin (mg) 0.2
Carb (g) 3.3	K (mg) 475	Riboflavin (mg) 0.37
Fibre (g) 3.6	Na (mg) 6	Niacin (mg) 1.6
Ash (g) 1.6	Zn (mg) 0.5	Vit B6 (mg) 0.24
	Cu (mg) 0.27	Folate (mcg) 129
		Vit C (mg) 57

#### Consumption

Both runner and cowpea leaves are used in the preparation of soups and eaten with millet, corn and cassava staples. Drained liquid from the boiled leaves is often used in the preparation of Tuo Zaafi. The leaves are also steamed and eaten with fried beans cake in the Upper West region.

# Cocoyam leaves

Cocoyam (*Xanthosoma* spp. / *Colocasia* spp.) leaves, “Kontomire” are consumed by all categories and age groups of people in Ghana in all the regions.

## Nutritional/health benefits

- Cocoyam leaves contain appreciable levels of protein and carbohydrate as major food nutrients.
- They also contain high amounts of calcium, magnesium, phosphorus, potassium,  $\beta$ -carotene, folate, niacin and vitamins A, C and E.
- All these nutrients work together to maintain and/or improve total body health.

## Agronomic tips

### Propagation

Cocoyam can be propagated vegetatively by side suckers, corms, small cormels, and suckers. Sets (200 g) or pre-sprouted cormels (900 g) are normally used for propagation. Some varieties do well on well-drained sandy soils and others on heavy soils with high water holding capacity but prefers deep fertile well-drained loam soils with a pH of 5.5–6.5 and temperature of about 21–27 °C.

### Spacing

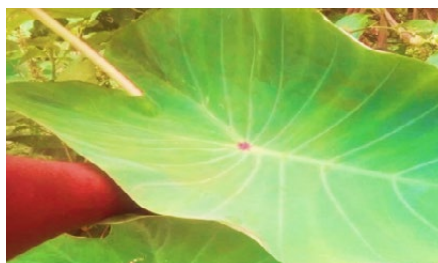
Space plants at 90 cm × 90 cm or in an equidistant range of 60–180 cm.

### Fertiliser

The crop responds well to supplemental nitrogen but in most tropical areas inorganic fertilisers are not applied. High soil nitrogen enhances vegetative growth and delays maturity. Like Taro (*Colocasia esculenta*) potash and Ca is required by the crop. Apply 40–80 kg/ha N, 15–30 kg/ha P and 50–100 kg/ha K.

### Yield

Leaf yield is not recorded but average yield of corms is 5–6 t/ha and a good crop on a fertile field yields 12 t/ha.



Cocoyam (top), Taro (down) leaves

### Nutrition content of Cocoyam leaves in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	35	Ca (mg)	63	Vit A-RAE (mcg)	376
Water (g)	90.2	Fe (mg)	2.4	$\beta$ -carotene equivalent (mcg)	4,510
Protein (g)	3.2	Mg (mg)	64	Vit E (mg)	2.02
Fat (g)	0.7	P (mg)	60	Thiamin (mg)	0.21
Carb (g)	3.1	K (mg)	418	Riboflavin (mg)	0.42
Fibre (g)	1.6	Na (mg)	3	Niacin (mg)	1.2
Ash (g)	1.3	Zn (mg)	0.41	Vit B6 (mg)	0.15
		Cu (mg)	0.27	Folate (mcg)	126
				Vit C (mg)	37

### Consumption

Cocoyam leaves are often used in soups and stews and consumed with starch-based staples.

# Jute mallow

Jute mallow (*Corchorus olitorius*), “Ayoyo” is mostly consumed in the following regions: North East, Northern, Ahafo, Oti, Savannah, Volta and Greater Accra. Jute mallow stew and/or soup is consumed by all categories of people in the said areas.

## Nutritional/health benefits

- Jute mallow contains more protein, carbohydrate, calcium, phosphorus potassium, and health promoting compounds such as beta-carotene, niacin, folate and vitamins A and C as compared to the other nutrients in their various categories.

## Agronomic tips

### Propagation

Jute mallow is propagated by seed. Direct sowing is common for harvesting at once or for cutting at soil level. Grows well on sandy loam with optimal temperature of 25–32 °C. A pH of 4.5–8.2 is tolerated by the plant.

### Spacing

Sow in lines at 30–50 cm apart and with a spacing of 10–15 cm within rows. Although the plant does not always survive transplanting, it can be transplanted at a height of 15 cm and spaced at 10 cm within rows, with 30 to 50 cm between rows depending on the variety used, or plants can be pulled out leaving a space of 20 cm between plants at first harvest. High yield can be obtained at a spacing of 10 cm × 45 cm.

### Fertiliser

Apply organic manure at a rate of 20 t/ha. A basal application of 400 kg/ha NPK 15–15–15 plus a side dressing of 100 kg/ha N for leaf production is recommended. The crop responds better to nitrate fertiliser than ammonium based ones.

### Irrigation

Irrigate during the dry season at rate of 6 mm/day.



Jute mallow “Ayoyo”, “Ademe” (in circle), wild mallow “Saalon piela” leaves

### Yield

A yield of 20–25 kg per 10 m<sup>2</sup> bed can be obtained from 3–9 cuttings. A well fertilised field can yield 38 t/ha.

### Nutrition content of Jute mallow in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	59	Ca (mg)	360	Vit A-RAE (mcg)	261
Water (g)	82.9	Fe (mg)	4.2	$\beta$ -carotene equivalent (mcg)	3,130
Protein (g)	3.9	Mg (mg)	58	Vit E (mg)	0.79
Fat (g)	0.3	P (mg)	122	Thiamin (mg)	0.15
Carb (g)	9.1	K (mg)	437	Riboflavin (mg)	0.53
Fibre (g)	2.0	Na (mg)	6.0	Niacin (mg)	1.2
Ash (g)	1.8	Zn (mg)	0.44	Vit B6 (mg)	0.3
		Cu (mg)	0.18	Folate (mcg)	118
				Vit C (mg)	80

### Consumption

Jute mallow is used in stews and soups and eaten with corn, millet, and cassava-based staples.

# Kenaf

Kenaf (*Hibiscus cannabinus*), “Berese” is commonly consumed in the Bono and northern parts of Ghana.

## Nutritional/health benefits

- Kenaf leaves contain recommendable amounts of fibre, calcium, magnesium, potassium, iron,  $\beta$ -carotene, folate and vitamins A and C which play key roles in promotion and maintenance of body health.



Kenaf (“Berese”) plant and leaves

## Agronomic tips

### Propagation

*Hibiscus cannabinus* (Kenaf) is propagated by seeds and cuttings. The crop performs best in well-drained fertile soils (sandy loams) with a neutral pH and at day temperatures between 16 °C and 27 °C.

### Spacing

Soak seeds in water for 24 hrs before sowing to enhance germination. Sow 2–3 seeds per hole at spacing of 15 cm  $\times$  15 cm or in rows of 30 cm apart to be thinned to 5–7 cm within row spacing for ratoon cropping. A spacing of 20–30 cm  $\times$  5–10 cm is used for fibre crops.

### Fertiliser

The crop responds well to organic manure and fertilisers. Apply 10–20 t/ha manure before planting but when not available apply 250 kg/ha compound fertiliser (e.g. NPK 15:15:15) and an additional 50 kg/ha N as a side dress at the first cut and at every harvest.

### Irrigation

Irrigate 500–625 mm at 4–5 months.

### Yield

A yield of 20–30 t/ha is attainable by uprooting the crop as a vegetable while a yield of 60 t/ha can be obtained from a ratoon crop.

### Nutrition content of Kenaf leaves in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	47	Ca (mg)	145	Vit A-RAE (mcg)	441
Water (g)	85.5	Fe (mg)	7.7	$\beta$ -carotene equivalent (mcg)	5,280
Protein (g)	2.8	Mg (mg)	83	Vit E (mg)	0.50
Fat (g)	0.6	P (mg)	42	Thiamin (mg)	0.13
Carb (g)	5.2	K (mg)	260	Riboflavin (mg)	0.06
Fibre (g)	4.6	Zn (mg)	0.63	Niacin (mg)	0.6
Ash (g)	1.3			Vit B6 (mg)	0.33
				Folate (mcg)	75
				Vit C (mg)	30

### Consumption

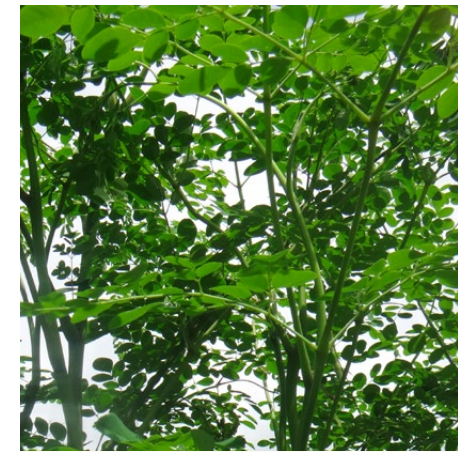
The leaves are used in the preparation of soups and eaten with starch staples.

# Moringa leaves

Moringa *Moringa oleifera* leaves are consumed in all parts of Ghana but consumed more in the northern parts of the country.

## Nutritional/health benefits

- Moringa leaf is rich in protein, carbohydrate, calcium, phosphorus, potassium,  $\beta$ -carotene, folate, and vitamins A and C which work in diverse ways to promote and/or maintain body health.



Moringa plant and leaves

## Agronomic tips

### Propagation

Moringa grows well in well drained fertile soils. It is propagated by seeds and cuttings (for high quality fruits). Sow seeds directly on the field at a depth of 2 cm in the rainy season or in an irrigated nursery. Water seeds twice daily until when they are 10–15 cm tall, then water once daily. At 3 months after sowing, transplant plants at a height of 40 cm. Branching is promoted by pollarding, coppicing and lopping or pruning.

### Spacing

As a monocrop space plants at 0.7–1 m but for a longer production a common spacing of 3–5 m. An intra-spacing of 2 m is used in alley cropping.

### Fertiliser

At planting out, apply manure in each hole or spread over the field to obtain good yields. Incorporate poultry manure at a rate of 30 t/ha two weeks before planting. Farmers also apply NPK 15–15–15 and urea at the base of the trunk. NPK can be applied at 30–120 kg/ha depending on the soil fertility and the diet nutrient of interest (e.g Ca and Fe minerals requires 30 kg/ha NPK).

### Irrigation

Required in locations with as little as 500 mm annual rainfall.

### Nutrition content of Moringa leaves in 100 g

Proximate composition and dietary energy		Mineral composition		Bioactive compound composition	
Energy (kCal)	92	Ca (mg)	440	Vit B1 (mg)	0.06
Water (g)	86.2	Fe (mg)	0.85	$\beta$ -carotene equivalent (mcg)	19,700
Protein (g)	6.7	Mg (mg)	42	Vit B2 (mg)	0.05
Fat (g)	1.7	P (mg)	70	Vit B3 (mg)	0.8
Carb (g)	12.5	K (mg)	259	Vit C (mg)	220
Fibre (g)	0.9	Cu (mg)	0.07	Folate (mcg)	40

### Consumption

Leaves are in the preparation of soups and stews, which is eaten with starch-based staples such as TZ.

## Okra

Okra (*Abelmoschus esculentus*), “Ma’ana”/“Nkruma” fruits and leaves are widely consumed in all the 16 regions of Ghana across all age categories.

### Nutritional/health benefits

- Okra fruits and leaves are rich in fibre, calcium, phosphorus, potassium and health promoting compounds such as  $\beta$ -carotene, folate and vitamins A and C.

### Agronomic tips

#### Propagation

Okra is propagated by seed and sown directly on ridges (irrigated) or flat beds (rainy season). It thrives on fertile well-drained sandy to clay loam with a pH of 6–6.8 and a temperature not less than 20 °C; germination percentage is high at temperatures between 30–35 °C, but negligible at temperatures below 17 °C and optimum at 29–30 °C.

#### Spacing

Spacing depends on the variety and the crop duration. Early unbranched varieties are spaced at 25 × 75 cm while clearly branched varieties are spaced 45 cm within rows. A spacing of 75 cm × 100 cm can also be used. Optimum plant density is in the range of 50,000–150,000 plants/ha. Seedlings are thinned to one per stand when they are 10 cm tall.

#### Fertiliser

Okra has high uptake of nutrients. A fruit yield of 10 t/ha requires 100 kg N, 10 kg P, 60 kg K, 80 kg Ca and 40 kg Mg. Prior to sowing, apply 20 t/ha manure or 250 kg/ha NPK 15:15:15. Okra species that take a long time to flower need 100 kg/ha top dressing of N in the form of urea during the vegetative phase. Also potassium can be applied at the same time. A top dress of NPK (15:15:15) is recommended.



Okro (“Nkruma”, “Ma’ana”) fruits (in circle) and leaves

#### Irrigation

8 mm/day (matured crops) or a moisture requirement of 50 mm per week.

#### Yield

Global average yield is 6 t/ha, and a good yield of 10 t/ha is attainable but the potential yield is between 30–40 t/ha. Under optimum conditions a yield of 40 t/ha can be achieved but yields are low (2–4 t/ha) under non intensive growing methods.

#### Nutrition content of Okra fruits/leaves in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 33/40	Ca (mg) 84/297	Vit A-RAE (mcg) 26/56
Water (g) 89.6/86.2	Fe (mg) 0.8/0.6	$\beta$ -carotene equivalent (mcg) 313/672
Protein (g) 1.7/2.7	Mg (mg) 13/38	Vit E (mg) 0.36/0.73
Fat (g) 0.2/0.3	P (mg) 40/73	Thiamin (mg) 0.04/0.16
Carb (g) 4.4/4.3	K (mg) 303/199	Riboflavin (mg) 0.08/0.41
Fibre (g) 3.2/4.9	Na (mg) 8/4	Niacin (mg) 0.7/0.2
Ash (g) 0.7/1.6	Zn (mg) 0.8/0.88	Vit B6 (mg) 0.22/0.3
	Cu (mg) 0.09/0.01	Folate (mcg) 88/118
		Vit C (mg) 28/64

#### Consumption

The fruits and leaves are used in the preparation of stews and soups which are eaten with staples.

## Pumpkin

Pumpkin leaves (*Cucurbita moschata*) “Yogvuuro” and fruits are widely consumed in the northern parts of Ghana (Upper East, Upper West, Savannah, North East and northern regions).

### Nutritional/health benefits

- Pumpkin leaves contain appreciable levels of protein, fibre, phosphorus, potassium,  $\beta$ -carotene, folate and vitamins A and C which are all essential for the promotion and maintenance of body health.

### Agronomic tips

#### Propagation

Propagation is by seed and cuttings (only for research purposes by using nodal roots). Sowing is done on small hills (planting holes) and in containers and transplanted to the field at a height of 10 cm. It does well on fertile, well-drained soils with a pH of 5.5–6.8 with optimum day and night temperatures above 20 °C and 14 °C, respectively.

#### Spacing

2 m × 2 m.

#### Fertiliser

Fertiliser application should be based on the soil fertility. The recommended fertiliser rate is 50–100 kg/ha N, 20–40 kg/ha P and 40–80 kg/ha K in the vegetative stage. A top dressing of 50 kg/ha NPK 10:10:10 is required at the first fruit set.

#### Irrigation

50 mm/week.

#### Yield

A yield of 5 t/ha, 15 t/ha and 30 t/ha is attainable for low input, intensive care and the use of improved strategies, respectively.



Pumpkin plant, (“Yogvivari”) leaves (left circle), fruit (right circle)

#### Nutrition content of African pumpkin leaves in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 27	Ca (mg) 39	Vit A-RAE (mcg) 192
Water (g) 90.4	Fe (mg) 2.2	$\beta$ -carotene equivalent (mcg) 2,300
Protein (g) 3.7	Mg (mg) 38	Vit E (mg) 0.96
Fat (g) 0.3	P (mg) 125	Thiamin (mg) 0.09
Carb (g) 1.3	K (mg) 468	Riboflavin (mg) 0.08
Fibre (g) 2.4	Na (mg) 11	Niacin (mg) 0.6
Ash (g) 1.9	Zn (mg) 0.2	Vit B6 (mg) 0.21
	Cu (mg) 0.13	Folate (mcg) 36
		Vit C (mg) 11

#### Consumption

The leaves and the tender fruits are used in the preparation of soups and eaten with millet, corn and cassava staples. Matured and ripened fruits are prepared into a pap and are eaten in some parts of Northern Ghana.



## Roselle

Roselle (*Hibiscus sabdariffa* L. var *sabdariffa*), “Bra”/“Bito/Bre” is widely consumed in the northern parts of Ghana (Upper East, Upper West, North East, Savannah and northern regions).

### Nutritional/health benefits

- Roselle leaves contain appreciable levels of fibre, calcium and potassium useful for maintenance of body health.
- It also contains high amounts of health promoting compounds such as vitamins A and C,  $\beta$ -carotene and folate.

### Agronomic tips

#### Propagation

Roselle is propagated by seed and it performs best in sandy loam soils with a pH of 6.5–7 and a temperature of about 25–32 °C.

#### Spacing

Space plants at 15 cm  $\times$  15–30 cm or 50 cm  $\times$  70 cm (calyx crop).

#### Fertiliser

The crop responds well to fertilisers. Ammonium sulphate is reported to give more yield than calcium nitrate and urea. For calyx production, fertiliser should be given at thinning (20–30 days after planting) in addition to the split application at the vegetative phase and at flowering. Calyx production is enhanced when a legume plant is intercropped two weeks after planting the crop. Apply 10–20 t/ha manure or 250 kg/ha compound fertiliser or 15 kg N, 15 kg P and 15 kg K per ha after weeding.

#### Irrigation

600–1000 mm annual rainfall.



Roselle plant and leaves

### Yield

Leaf yield of 20 t/ha from three cuttings have been recorded. The yield of fresh calyx range from 4–6.5 t/ha, or about 800–1200 kg/ha when dried to 12% moisture content.

### Nutrition content of Roselle in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 40	Ca (mg) 212	Vit A-RAE (mcg) 215
Water (g) 86.7	Fe (mg) 4.1	$\beta$ -carotene equivalent (mcg) 2,580
Protein (g) 2.8	Mg (mg) 58	Vit E (mg) 1.90
Fat (g) 0.2	P (mg) 65	Thiamin (mg) 0.17
Carb (g) 4.1	K (mg) 437	Riboflavin (mg) 0.45
Fibre (g) 5.0	Na (mg) 6	Niacin (mg) 1.2
Ash (g) 1.2	Zn (mg) 0.9	Vit B6 (mg) 0.3
	Cu (mg) 0.18	Folate (mcg) 117
		Vit C (mg) 33

#### Consumption

It is used in the preparation of soups and eaten with millet, corn and cassava staples. Drained liquid from the boiled leaves is often used in the preparation of Tuo Zaafi, a popular staple in some parts of the northern Ghana.

## Sponge gourd

Sponge gourd (*Luffa* spp.) “Zambole”/“Sambola”/“Abrofo Sapo” is cultivated and is mostly consumed in the Bono and northern parts of Ghana.

### Nutritional/health benefits

- Sponge gourd stands out in its phosphorus, potassium, folate and vitamins A and C contents as compared to the other nutrients it contains.

### Agronomic tips

#### Propagation

Luffa is grown by seeds. Seeds are sown on ridges or mounds, 2–3 seeds per hill at a spacing of 50–60 cm  $\times$  200 cm in a trellised system or generally 1 m  $\times$  1 m is practiced. Without trellising, a spacing of 300 cm should be left between rows. It prefers a well-drained sandy fertile soil and a pH of 6.5–7.5; temperature of 20–30 °C.

#### Fertiliser

The crop responds well to NPK fertiliser. NPK fertiliser enhances growth, flowering and fruit formation. Apply a basal dressing of NPK (e.g. 14–14–14) at the rate of 25 g/hill, followed by side dressings of 20 g/hill of urea or NPK at two week intervals.

#### Irrigation

The crop requires 1000–2000 mm annual rainfall.

#### Yield

Landraces yield about 10–15 t/ha. An average yield of 27 t/ha of young fruits is reported for hybrid cultivars under good management.



Ridged gourd (*Luffa acutangula*) “Saalo”

### Nutrition content of Sponge gourd in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 20	Ca (mg) 20	Vit A (IU) 410
Water (g) 93.85	Fe (mg) 0.36	Vit E (mg) 0.1
Protein (g) 1.2	Mg (mg) 14	Thiamin (mg) 0.05
Fat (g) 0.4	P (mg) 32	Riboflavin (mg) 0.06
Carb (g) 4.4	K (mg) 139	Niacin (mg) 0.4
Fibre (g) 1.1	Mn (mg) 0.09	Vit B6 (mg) 0.04
	Zn (mg) 0.07	Folate (mcg) 7
	Cu (mg) 0.04	Vit C (mg) 12

#### Consumption

It is often used in stews and eaten with starchy staples such as Tuo Zaafi, Banku or boiled yam or cassava.

# Sweet potato leaves

Sweet potato (*Ipomea batatas*) “Abrodwomaa” leaves are widely consumed in Ghana but largely in the northern parts.

## Nutritional/health benefits

- Sweet potato leaves contain recommendable levels of protein, calcium, magnesium, phosphorus, potassium, as well as  $\beta$ -carotene, folate, and vitamins A and C.
- These compounds are very crucial for healthy functioning of the body.

## Agronomic tips

### Propagation

Propagation is by stem, or root cuttings or adventitious shoots (clips). The crop performs best in well-drained light and medium-textured soils or sandy loam or lighter sandy soils with irrigation; with an adaptable pH of 4.5–7.5 or an optimum pH of 6.0–7.5. The optimum temperature for growth is 24 °C, and a day and night temperature of 29 °C and 21 °C respectively. Sprouting is best at a temperatures between 28–30 °C. High temperatures inhibit root growth more than vine growth.

### Spacing

The crop is usually grown on mounds or ridges at 70 cm apart and 30 cm within rows. A spacing of 22–30 cm in a row and 90 cm between rows can also be used.

### Fertiliser

The crop is sensitive to soils low in Ca, B and Mg. High nitrogen application delays tuber production but enhances undesirable vigorous vine and foliage growth. A pre-planting base dressing of balanced NPK of 40 g/m<sup>2</sup> is recommended and where soils are low in K, top dressing is recommended halfway between planting and harvesting. Apply 30 kg/ha N, 45 kg/ha P and 60 kg/ha K.



Sweet potato plant, leaves (in circle)

### Irrigation

For active growth, the crop should be irrigated 25–30 mm per week. At 7–10 days irrigation of 200–250 m<sup>3</sup>/ha is recommended.

### Yield

The global average yield is 13 t/ha.

### Nutrition content of Sweet potato leaves in 100 g

Proximate composition and dietary energy	Mineral composition	Bioactive compound composition
Energy (kCal) 51	Ca (mg) 37	Vit A-RAE (mcg) 489
Water (g) 84.7	Fe (mg) 3.6	$\beta$ -carotene equivalent (mcg) 5,870
Protein (g) 4.4	Mg (mg) 61	Vit E (mg) 0.96
Fat (g) 0.2	P (mg) 87	Thiamin (mg) 0.13
Carb (g) 6.7	K (mg) 522	Riboflavin (mg) 0.31
Fibre (g) 2.3	Na (mg) 9	Niacin (mg) 1.0
Ash (g) 1.8	Zn (mg) 0.29	Vit B6 (mg) 0.19
	Cu (mg) 0.04	Folate (mcg) 80
		Vit C (mg) 11

### Consumption

The leaves are prepared into stews and soups and eaten with starchy staples.

# Turkey berry

Turkey berry (*Solanum torvum* Sw.) “Kwahunsuasua”/ “Abeduru” and *Solanum pauperum* (C.H. Wright) “Nsusua” fruits are widely consumed in Ghana across all regions and across all age groups.

## Nutritional/health benefits

- Turkey berry is rich in calcium, magnesium, iron, zinc and copper.
- It also contains appreciable amount of vitamin C.

## Agronomic tips

### Propagation

Turkey berry is propagated by seeds or semi-hard cuttings. Performs best in well moist fertile soils with a pH of 5.5–6.5 and a temperature of about 25–35 °C (day) and 20–27 °C (night). Seeds are sown in the nursery and transplanted at 5–6 weeks at a spacing of 1 m × 1 m. Semi-hard wood cuttings from fresh shoots, 12–15 cm long without leaves produces roots and new shoots in 3–4 weeks.

### Fertiliser

Apply 10–20 t/ha manure or apply 100 kg/ha, 50 kg/ha; and 50 kg/ha of N, P, and K respectively at planting but the N dose should be a split dose.

### Irrigation

5 mm/day/plant or prefers 1000–2000 mm annual rainfall.



Turkey berry “Kwahu nususua” and “Nsusua” (in circle)

### Nutrition content of Turkey berry in 100 g

Proximate composition and dietary energy	Mineral composition /kg	Bioactive compound composition (mg/100 g)
Energy (kCal) 40	Ca (mg) 222	Pro-Vit A (mg) 0.095
Water (g) 86.23	Fe (mg) 76.9	Vit C (mg) 2.69
Protein (g) 3.7	Mg (mg) 19.5	
Fat (g) 0.6	K (mg) 695	
Carb (g) 7.03	Zn (mg) 21.46	
Fibre (g) 3.99	Cu (mg) 2.642	
Ash (g) 0.14		

### Consumption

The fruits are added to soups and stews and eaten with staples such as *fufu*.

# West Indian nettle

West Indian nettle (*Laportea aestuans*), “Honhon”/ “Bonhon” is largely consumed in the southern parts of Ghana.

## Nutritional/health benefits

- West Indian nettle is a good source of protein, fibre, carbohydrate, calcium, phosphorus and  $\beta$ -carotene.

## Agronomic tips

### Propagation



The plant is propagated by seeds. It is considered as an agricultural weed and it is spread by accidental dispersal, water dispersal and prolific seed production. *L. aestuans* is more common in the rainy season, and is found mostly in shady and cool environments as a weed.



West Indian nettle (“Honhon”)

### Nutrition content of West Indian nettle in 100 g

Proximate composition and dietary energy	Mineral composition /kg	Bioactive compound composition (mg/100 g)
Energy (kCal) 53	Ca (mg) 440	$\beta$ -carotene 5,035
Water (g) 80.0	Fe (mg) 1.5	(mcg)
Protein (g) 5.8	P (mg) 114	
Fat (g) 0.4		
Carb (g) 10.0		
Fibre (g) 3.0		
Ash (g) 2.1		

### Consumption

West Indian nettle is often consumed in stews and soups.

## REFERENCES

- Akoto, O., Borquaye, L.S., Howard, A. S. and Konwuruk, N. (2015). Nutritional and Mineral Composition of the Fruits of *Solanum torvum* from Ghana. *International Journal of Chemical and Biomolecular Science*. 1(4):222–226.
- Bukenya-Ziraba, R. and Bonsu, K.O. (2004). *Solanum macrocarpon* L. [Internet] Record from PROTA4U. Grubben, G.J.H. & Denton, O.A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. <<http://www.prota4u.org/search.asp>>. Accessed 13/9/ 2020.
- Copley, L.S. (1975). *An introduction to the botany of tropical crops*. Longman Group, U.K.
- FAO/INFOODS (2020). FAO/INFOODS Food Composition Table for Western Africa (2019): User guide and condensed food composition table, Rome. pp. 192–223.
- Food and Agriculture Organization of the United Nations (2012). West African Food Composition Table, Rome. pp. 31–39.
- Gopalakrishnan, L., Doriya, K. and Kumar, D.S. (2016). Moringa oleifera: A review on nutritive importance and its medicinal application. *Food Science and Human Wellness* 5:49–56.
- Leung, W.-T.W., Busson, F. and Jardin, C. (1968). *Food composition table for use in Africa*. FAO, Rome, Italy. p. 306.
- Ngalamu, T., Odra, J. and Tongun, N. (2015). *Cowpea production handbook*.
- Schippers, R. (2000). *African indigenous vegetables: An overview of the cultivated species*. Chatham, UK: DFID/ICTA/NRI.
- USDA Nutrient Database: Facts and figures.
- Arakai, D. and Lao, C. (2012). *Laportea aestuans* (L) Chew-West Indian Wood nettle. New Pest Advisory No 12-02. Plant Pest Control Branch, Division of Plant Industry, Hawai'i Department of Agriculture, Honolulu.
- Soladoye, M.O. and Adebisi, A.A. (2004). *Luffa acutangula* (L.) Roxb.J. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 370–373.
- Siemonsma, J.S. and Kouamé, C. (2004). *Abelmoschus esculentus* (L.) Moench]. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 25–29.
- Grubben, G.J.H. and F. Chigumira Ngwerume, F. (2004). *Cucurbita moschata* Duchesne]. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 267–273.
- Madamba, R. and Grubben, G.J.H. (2004). *Vigna unguiculata* L. Walp]. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 550–556.
- McClintock, N.C. and El Tahir, L.M. (2004). *Hibiscus sabdariffa* L.J. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 321–326.
- Safo Kantanka, O. (2004). *Coocasia esculenta* (L.) Schott]. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 206–211.
- Lester, R.N. and Seek, A. (2004). *Solanum aethiopicum* L.J. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 472–477.
- Schippers, R.R. (2004). *Solanum torvum* SW. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 501–503.
- Grubben, G.J.H. (2004). *Amaranthus cruentus* L.J. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 67–72.
- Bosch, C.H., Sié, K. and Asafa, B.A. (2004). *Adansonia digitata* L.J. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 36–40.
- Schippers, R. (2000). *African indigenous vegetables: an overview of the cultivated species* (Chatham, UK: DFID/ICTA/NRI).

- Fondio, L. and Grubben G.J.H. (2004). *Corchorus Olororius* L.]. In: Grubben, G.J.H. & Denton, O.A. (Editors). *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen, Netherlands / Backhuys Publishers, Leiden, Netherlands / CTA, Wageningen, Netherlands, pp. 217–221.
- Olufunke, M.D., Adebayo O.I., Ajani O.I., and Ose O. (2008). Comparison of the chemical compositions of the essential oils from the aerial parts, fruits and roots of Nigerian *Laportea aestuans* (L.) Chew (Urticaceae). *Nat. Prod. Comm.* 3: 1921–1924.
- Olunloyo, A.A., Ilokhoria, O.R., Aderemi, F.T., Amoo, A.M., Olomola, D.B., Aderemi, A.M., Adekunle, E.A. (2019). Influence of Nitrogen Fertilizer on the Growth and Yield of African Egg plant (*Solanum Macrocarpon* L) (accessed 12 December 2020). <https://www.ijaar.org/articles/Volume5-Number10/Sciences-Technology-Engineeringijaar-ste-v5n10-oct19-p3.pdf>.
- Adeyeye, A.S., Akanbi, W. B., Olalekan, K.K., (2014). "The Growth, Yield And Seed Quality Of *Solanum Macrocarpon* As Affected By NPK Fertilizer." *Journal of Advanced Studies in Agricultural, Biological and Environmental Sciences*, 1: 52–57.
- Husseini, R., Mahunu, G.K., Wireku, P., and Dzomeku, I.K., (2016). Response of Growth and Leaf Yield of *Adansonia Digitata* Seedlings to Soil Amendments and Harvesting Regimes. *Journal of Multidisciplinary Engineering Science and Technology*, 3(12):6114–6118.
- Sim, Y. Y., and Nyam, K. L. (2020). *Hibiscus cannabinus* L. (kenaf) studies: Nutritional composition, phytochemistry, pharmacology, and potential applications, *Food Chemistry*, <https://doi.org/10.1016/j.foodchem.2020.128582>
- Otu, P. N. Y., Sarpong, F., Gidah, J. E., Labanan, A.-M. & Anim, D. (2017). Characterization of turkey berry (*Solanum torvum*) – fresh, dry & powder. *African Journal of Food and Integrated Agriculture*, 1(2), 9–14. <https://doi.org/10.25218/ajfia.2017.01.001.02>

## HortiFresh West Africa

Sheila Assibey-Yeboah

Program Manager

(+233) 263794715

[www.hortifresh@snv.org](mailto:www.hortifresh@snv.org)

