Perennial Vegetables

Plant once and
harvest for years.

Beth Doerr
ECHO Forum, Accra

Perennial Vegetables

Perennials: plants that live for at least 3 years

Vegetables: plant parts that are typically cooked and taste savory (culinary definition)

Perennial Vegetables

Benefits:

Year round food	Low maintenance
Healthy ecosystem	Build soil
Provide beauty	Multi-purpose

Perennial Vegetables

Records indicate that 3000 native African plants have been used for food.

Out of Africa's top vegetables today only 3 are native: cowpea, yam and okra.

Valuable ~~Perennial~~ Vegetables

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Valuable Vegetables

Amaranth	Lablab
Bambara Bean	Locust Bean
Baobab	Marama
Cassava	Mint Potatoes
Celosia	Moringa
Chufa/Tigernut	Okra
Cowpea	Pigeon Pea
Dika	Shea
Eggplant	Sweet Potato
Egusi	Yambean

Valuable Vegetables

Amaranth (Africa)	Lablab (Africa)
Bambara Bean (Africa)	Locust Bean (Africa)
Baobab (Africa)	Marama (Africa)
Cassava (Americas)	Mint Potatoes (Africa)
Celosia (Africa)	Moringa (Africa)
Chufa/Tigernut (Egypt/World)	Okra (Africa)
Cowpea (Africa)	Pigeon Pea (Asia)
Dika (Africa)	Shea (Africa)
Eggplant (Africa)	Sweet Potato (Americas)
Egusi (Africa)	Yambean (Africa)

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Egusi (Africa)	Yambean (Africa)

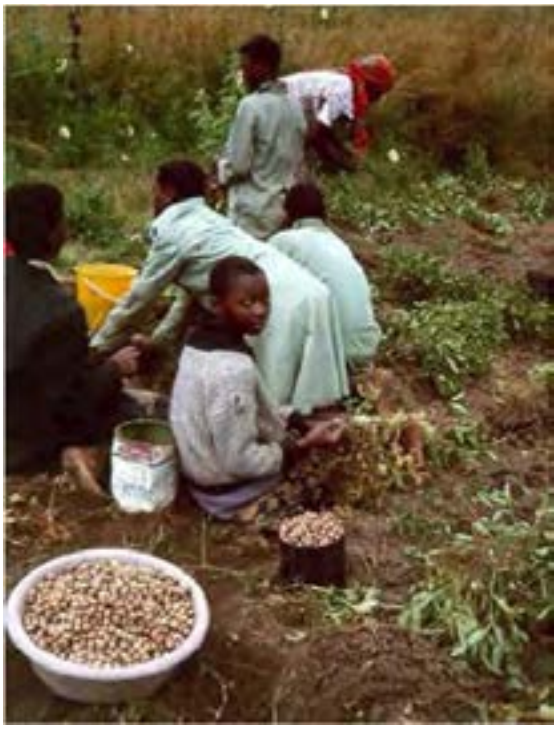

Local Names: Madze, efan, muotsu, swie, grins, hondi

Amaranth (*Amaranthus sp*)

- Young leaves, stems and flower heads used; throw out water if using older leaves
- Young leaves and growing tips can be used in salads
- Leaf powder used to fortify other foods
- Leaves up to 33% protein with lysine and methionine, vit A, vit C, Fe, Ca
- Seeds have good protein content (%17) and oil; can be parched and milled into flour or popped
- Good forage crop for animals

Amaranth (*Amaranthus sp.*)

- Can harvest within 3 weeks
- Avg green weight yield of 4-14t/ha; 40t/ha possible; $10m^2$ yields 60kg
- C4 plant; shade tolerant
- 3000mm annual rainfall, 22-40C, well-drained soil, pH 5.5-7.5
- Climate: humid lowlands, dry savannas, uplands



(photo from Lost Crops book)

Local Names: aboboi, akyii, epi roro, guijiya, okboli ede, agbaroro

Bambara Bean (*Vigna subterranea*)

- Seeds of this plant are dug from the ground and it is comparable to groundnuts
- Immature seeds can be boiled, roasted or fried
- Dried seeds can be boiled, ground into flour, crushed into a paste, or made into a “milk”
- Considered a complete food: 60% carbohydrate, 20% protein, 6% oil, plus vitamins and minerals; rich in soluble fiber and high in calories
- Beans, leaves and crop residue good animal feed

Bambara Bean (*Vigna subterranea*)

- Avg yield 400kg/ha; potential yields 4000kg/ha
- There are sprawling types and bush types
- Fixes N; possible striga suppression
- Thrives in lateritic soils; produces in areas too hot and dry for groundnuts or maize; drought tolerant and withstands unreliable rainfall patterns; 90-180 days to mature
- 600-1000mm annual rainfall, 20-40C, loose well-drained soil, pH 5-6.5
- Climate: humid lowlands, dry savannas, uplands

Baobab (*Adansonia digitata*)

- Leaves are steamed or cooked in soups and sauces
- Surplus leaves can be dried and stored
- 15% protein, all essential amino acids, vit A, vit C, Ca, Fe, K, Mg, Ph, etc, and dietary fiber
- Fruit and seeds are edible and used in various beverages and snacks
- Bark used as a fuel, fiber for cord and fabric
- Leaves make excellent animal feed

Baobab (*Adansonia digitata*)

- Store 10,000 liters of fresh, clean water; claims of trees over 1000 years old; resist fire and drought
- Grows up to 20m tall and 30m circumference
- Scarify seeds by soaking in boiling water for 5 min; seedlings can grow about 1m per year
- 90-2000mm annual rainfall, 28-42C, does not like standing water
- Climate: dry savannas; might have potential in humid lowlands

Cassava (*Manihot esculenta*)

- Native to the Americas
- Leaves are very nutritious, high in protein (#2), vit A & Fe
- Roots are good source of carbohydrates
- Possible to harvest leaves while roots are maturing

- Does well on poor soils and low rainfall
- Tolerates low pH and high AL
- Does not tolerate flooding or saline soils
- Climate: humid lowlands, dry savannas, uplands

Celosia (*Celosia argentea*)

- Fresh young leaves, tender stems and immature flower spikes are edible and produce a tasty and nutritious soup
- Leaves contain 30% protein, vit A, vit C, Ca, & Fe
- Discard cooking water due to oxalates and nitrates
- Good for chickens or cattle (may accumulate oxolates)
- Ornamental and keep their color when dried
- Potential for striga suppression

Celosia (*Celosia argentea*)

- Often reseed themselves
- 3-6 weeks after sowing plants can be thinned and thereafter harvest new leaves and terminal shoots every 1-2 weeks for 3-5 months
- A 5m2 test plot produced 8kg=16t/ha (green variety) 14kg=28t/ha (red variety)
- At least 600mm annual rainfall, frost sensitive, grows in most soils, weed potential (world's prettiest)
- Climate: humid lowlands, uplands

(stock photo)

Chufa/Tigernut (*Cyperus esculentus*)

One of the worst weeds for more than 30 countries

- Tubers contain starch, fat, sugar, protein, phosphorus, potassium, and vitamins E and C.
- Tubers contain almost twice the quantity of starch as potato or sweet potato tubers.
- Tubers can be consumed raw, roasted, dried or baked
- Tubers can be ground into a flour and are used for a popular drink in many places called “horchata”.
- Tubers 20-36% oil and have potential as biodiesel.

Chufa/Tigernut (*Cyperus esculentus*)

- One of the oldest cultivated plants of ancient Egypt
- Member of the sedge family
- One plant can produce over 1000 edible tubers in a single growing season
- Grows in almost any warm climate and thrives in difficult conditions

Cowpea (*Vigna unguiculata*)

- Leaves and stem tips can be steamed or boiled or dried and ground into a leaf powder
- Green pods/beans are boiled, steamed, fried or roasted
- Dried seeds are boiled or made into flour
- Cowpea seed is rich in protein (24%) and in digestible carbohydrates and lysine along with 2% oil
- Low in antinutrients
- Leaves and plant residue good for animal feed and can be dried and bundled as hay

Cowpea (*Vigna unguiculata*)

- Drought tolerant and adapted to poor soils
- Deep roots stabilize soil, biomass protects ground and conserves moisture, fixes N, good intercrop
- Some can mature with as little as 300mm rainfall
- 60-240 days to maturity; typically flower when rains end
- Avg yield 100-300kg/ha dry seed; potential yeilds of 2000kg/ha
- Insects are major constraint, along with humidity
- Climate: dry savannas, uplands

Cowpea (*Vigna unguiculata* subspecies *sesquipedalis*)

- Tender, stringless, succulent, sweet pods can reach 100cm
- High yielding in small spaces
- Developed in Asia from cowpea ancestors
- Leaves harvested in 21 days, pods in 60 days, productive for several months; 11t/ha
- Climate: humid lowlands, dry savannas, uplands

Local Names: oro, oba, abesebuo, goron, biri, oro, moupiki, andok, bobo

Dika (*Irvingia gabonensis* and *I.wombolu*)

- Edible fruits and seeds
- Fruits eaten fresh or made into jams or jellies or juice; have more vit C than oranges and also have vit A
- Nuts eaten raw, roasted, made into butter or cakes or ground and mixed with spices; kernels are high in oil and protein including 6 of 8 essential amino acids
- Oil used in margarine, soap and pharmaceuticals
- Once oil is extracted the kernel meal is a shelf-stable ogbono soup ingredient

Dika (*Irvingia gabonensis* and *I.wombolu*)

- Deciduous tree reaching 30-40m, native to western Africa
- Vegetative propagation (grafting, cuttings, budding and air-layering) is possible and budded trees produce fruits in 2-4 years
- Thrives in forest conditions with sun or shade, heat, humidity and loamy to clay soils; good for controlling soil erosion
- Climate: humid lowlands

Eggplant (*Solanum aethiopicum*)

- High yielding, easy to grow and simple to harvest
- Fruits are cooked, they can be pureed like tomatoes, excess can be dried
- Fruits can be eaten raw
- Some types are sweet and some bitter
- Some have edible leaves (contain solanine so they must be cooked)
- Mild flavor and not especially nutritious; 92% water, some protein, vitamins, minerals and starch, good K
- Spongy texture absorbs other food's flavor

Eggplant (*Solanum aethiopicum*)

- Related to the Asian S.melongena
- Fast maturing and produce for several months
- Storage life up to 3 months and transport well
- Tolerate shade, poor soils and small spaces
- Harvest 70-90 days after sowing; harvest continues 8-10 weeks; for leaves, 5-8 weekly harvests possible
- Yields vary, one test of 3 plants produced 10kg fruits
- 500-1200mm annual rainfall, 15-35C, well-drained soil
- Climate: humid lowlands, dry savannas, uplands

Local Names: neri, niri, guna shanu, denne nai, ibara, ito

Egusi (*Citrullus lanatus*)

- Melon grown for its large white seeds
- Seeds are ground into a flour and used in soups or dumplings or as a seasoning.
- Seeds can be roasted and ground to make a spread, popped like popcorn, parched and eaten as a snack, or compacted into patties and used as a meat substitute
- More than 50% oil (good quality for cooking), 30% protein, high in calories, 3 amino acids, B vitamins

Egusi (*Citrullus lanatus*)

- Seeds store easily
- Harvest 4-6 months after sowing; fruits can remain in the field and keep well
- Average yields of 2-5 fruits per plant
- Grows easily and thrives on poor soils, tolerates range of conditions from damp to dry
- Good ground cover, suppresses weeds and protects soil, few pests or diseases
- 250-500mm annual rainfall, 23-36C, loose soil
- Climate: humid lowlands, dry savannas

Lablab (*Lablab purpureus*)

- Immature pods and seeds are boiled or roasted
- Mature seeds can be used like any bean, boiled, roasted, processed into tofu or tempeh or a paste
- Sprouts are similar to mung bean sprouts
- Leaves and flowers can be used in soups and sauces
- Seeds are 25% protein and have lysine; antinutritional compounds; leaves are 28% protein and high in Fe
- Varieties developed for forage and green manure crops; fodder yields of 5-10t/ha, good for silage, withstands grazing or cutting, can be grazed 60 days after planting

Lablab (*Lablab purpureus*)

- Indian cultivar produced 7.5t/ha, avg yield 2-5t/ha; some produce pods in 60 days; can live 2-3 years
- Deep roots make it a good ground cover, fixes nitrogen, high yielding, resists droughts, stays green and productive well into the dry season; suppresses weeds and rejuvenates soils
- Thrives on acidic soils with low fertility and high Al
- Thrives in high heat and humidity as well as dry areas
- 600-900mm annual rainfall, 18-40C, well-drained soils
- Climate: humid lowlands, dry savannahs, uplands

Local Names: nere, nete, dawa-dawa, kinds

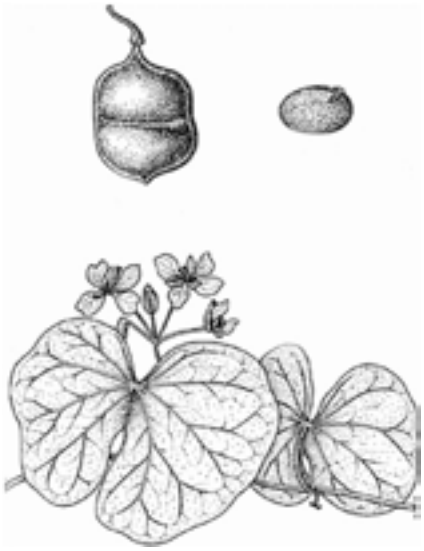
Locust Bean (*Parkia biglobosa*)

- Pods mature in dry season
- Sticky, sour pulp is 60% sugar, rich in protein, vitC and food energy
- Pulp is eaten fresh, made into drinks and dried into powder then sprinkled over rice or meat
- Seeds made into fermented sticky balls (dawadawa) for seasoning and soups; keeps well without refrigeration; 30% protein with high lysine levels, 20% fat, 12% sugar, 15% starch, 12% fiber and have Ca and Fe and vitB2

Locust Bean (*Parkia biglobosa*)

- Seeds sprout easily and grow quickly; grows 20m tall
- Grafting and budding have been done successfully
- Pruning said to speed fruiting
- Yield around 350-500kg/ha
- Provide food, edible oil, fodder, lumber, firewood, green manure, toothbrush sticks
- Survives fire, thrives in full sun and tropical heat
- 600-700mm annual rainfall, frost sensitive, any soil
- Climate: dry savannas

(stock photo)



Drawing courtesy of PROTA (prota.org)
redrawn and adapted by Achmad Satiri Nurhaman

Photo from Lost Crops book

Marama (*Tylosema esculentum*)

- Seeds rival peanuts or soybeans in nutritive quality and are eaten raw, roasted, boiled, or pounded
- Seeds provide a quality vegetable oil and remaining seedcake is 52% protein
- High protein tubers can be baked, boiled or roasted; typically harvested at around 1kg but one was weighed at 300kg
- Tubers are 90% water, living cisterns which can hold 250kg of water

Marama (*Tylosema esculentum*)

- Survives in poor quality soil under harsh climates (temperatures up to 50C and little water)
- May take 2-4 years for seed production and for tubers to reach harvestable size
- Climate: semiarid

Drawing courtesy of PROTA (prota.org)

Local Names: fabourama, fra-fra potato, saluga, tumuku

Mint Potatos (*Solenostemon rotundifolius*)

- Slightly sweet tubers can be eaten raw, boiled, roasted, baked or fried and can replace potatoes in most recipes
- Tubers can also be dried or processed into flour and stored
- Nutritious and productive they have vit A, Ca, Fe and 5-13% protein that includes several amino acids

Mint Potatos (*Solenostemon rotundifolius*)

- Tubers ready to harvest after 120-200 days
- Produce large amounts of food in a small area; avg yield of 15t/ha and potential yields of 50t/ha
- Propagated by tubers but maybe stem cuttings as well
- Tolerant to high temperatures and rainfall
- 1000mm annual rainfall, deep well-drained soils
- Climate: humid lowlands, dry savannas
- [*Plectranthus esculentus* of Southern/Eastern Africa grows with 450mm annual rainfall]

Moringa (*Moringa oleifera*)

- Leaves can be eaten fresh or cooked or dried into a powder and contain 30% protein (#3), all essential amino acids along with vits A,B,C, Ca and Fe
- Young pods can be cooked and contain 20% protein, all essential amino acids along with vits A,B&C and minerals; mature pods can be cooked or pickled
- Immature seeds can be boiled, roasted or fried and also have oil and can purify water
- Flowers can be used to make a tea or fried

Moringa (*Moringa oleifera*)

- One tree can produce 1000 pods in a season and supply leaves year round
- Fast growing, 3-5m per year
- Grown by seeds or cuttings
- 250-1500mm annual rainfall, 20-40C, well-drained soils
- Climate: humid lowlands, dry savannas, uplands

Okra (*Abelmoschus esculentus*)

- Pods can be boiled, stir-fried, fried, steamed, baked, grilled, pickled, dried, processed into a flour, etc; thickening agent; high in soluble fiber
- Tender leaves can be cooked or dried and powdered; contain protein, vit A&C, Ca, Fe
- Immature seeds can be eaten like peas
- Mature seeds can be roasted and ground as a coffee substitute; 40% oil producing good quality oil (short shelf life); seed meal used in foods for animals and people
- Stems contain high quality bast fibers and could be a good source for making paper and can be used as a fuel

Okra (*Abelmoschus esculentus*)

- Robust, productive, fast growing, high yielding plant
- Flowering begins 2 months after planting
- Yields approaching 9000kg/ha; 3 harvests per week for 30-40 days
- Adapts to difficult conditions and can thrive where other food plants are unreliable
- Climate: humid lowlands, dry savannas, uplands

Pigeon Pea (Cajanus cajan)

- Native to Asia
- Immature pods and seeds are boiled
- Mature seeds are boiled or ground into a flour
- Plants also produce fiber and stalks can be used as a fuel source
- Excellent fodder with high nutritional value

Pigeon Pea (Cajanus cajan)

- Seeds mature in 90-260 days
- Average yields of 700kg/ha
- Fixes N
- Drought resistant, can grow with 650mm annual rainfall, 18-30C

Photo from Lost Crops book

Photo from Lost Crops book

Shea (*Vitellaria paradoxa*)

- Egg shaped nuts produce fat that remains solid in tropical conditions
- Shea butter used as cooking fat, in margarine and other foods; and also in soaps, ointments, hair products, skincare products, and to waterproof houses
- Seed kernels eaten fresh or roasted
- Fruit pulp is eaten fresh
- Flowers eaten in salads
- Labor intensive to process

Shea (*Vitellaria paradoxa*)

- Prevent wind erosion, good agroforestry tree; trees are fireproof
- Seeds germinate easily when fresh; difficult to transplant due to long taproot
- Trees take 12-25 years to bear fruits and 30-50 yrs for full productivity
- High yield of 45kg, avg yields 5-20kg of fruit per year = 3-4kg of kernels = 1.5-2kg fat but with traditional extraction equals less than 1kg of shea butter
- Climate: dry savannas

Sweet Potato (*Ipomea batata*)

- Native to the Americas
- Tubers can be boiled, roasted, baked, fried, shredded & toasted, or processed into flour or starch; rich in vit C&A, K and dietary fiber
- Tender leaves are boiled, steamed, stir fried, or dried and stored for later use; rich in protein, Ca, Fe, Zn, vit B
- Tubers vines and leaves make good animal feed
- Toyota has begun making biodegradable plastics from sweet potato starch

Sweet Potato (*Ipomea batata*)

- Avg time to harvest is 4.5 months; 2-9 months
- Grown from cuttings that are rested for 1-3 days
- Easy to grow, relatively free of pests and diseases, and relatively high production
- Able to produce more nutrients per hectare than almost any other crop on poor soils
- Survive at any temperature above freezing
- Require moist, well-drained soil; need adequate water for first few months and tolerate drought after that
- Climate: humid lowlands, dry savannas, uplands

Photo from Lost Crops book

Local Names: kutreku, kulege, akitereku, girigiri, kutonoso, efik, ibibio, pempo

Photo from Lost Crops book

Photo from Lost Crops book

Yambean (*Sphenostylis stenocarpa*)

- Seeds boiled, roasted or ground into a paste; 20-29% crude protein with good amino acid levels
- Leaves said to be edible but not much is known; possibly good fodder as well
- Tubers eaten fresh, steamed, boiled, baked, pickled, ground into a flour, etc; 11-19% protein (2x the protein of sweet potatoes or yams) with good amino acid levels

Yambean (*Sphenostylis stenocarpa*)

- Pods mature 150 days after sowing and continue as long as climate remains conducive, harvesting usually ceases after 60 days; tubers take 5-8 months to reach harvestable size
- Seed yields of 2t/ha; tuber yields around 50t/ha
- Fixes N, potential to add 120-150kg N per ha; good in crop rotation for restoring soil fertility
- Tolerates acidic, infertile soils; 900-1400mm annual rain
- Climate: humid lowlands and uplands; grows on marginal soils

Valuable Vegetables

- Amaranth
- Bambara Bean
- Baobab
- Cassava
- Celosia
- Chufa/Tigernut
- Cowpea/Long Bean
- Dika
- Eggplant
- Egusi
- Lablab
- Locust Bean
- Marama
- Mint Potatoes
- Moringa
- Okra
- Pigeon Pea
- Shea
- Sweet Potato
- Yambean

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