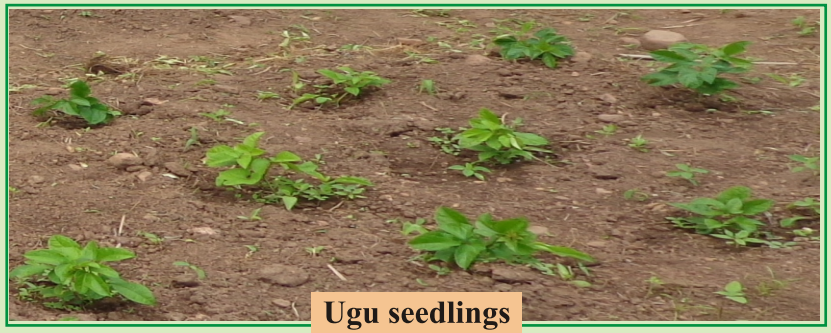
iv. Seeding density: The planting distance could be 0.5 m x 1.0 m or 0.25 m x 1.0 m. Sowing is done by planting one treated seed per hole.

Planting of seeds

v. Planting method: Sowing of seeds is done immediately after treatment. Planting hole should be about 3-5 cm deep. Care must be taken to ensure that sowing is done correctly. Any mistake during sowing could adversely affect seedling emergence. To sow seeds correctly, identify the pointed end of the seed. The seed is planted with the pointed end facing down. Some seeds are round in shape, thus having no conspicuous pointed end. For this situation, the seed is laid flat in the hole. The planted seed is firmly covered with soil.

C. Germination: Well treated seeds germinate at about 10 days of planting.



Ugu seedlings

CAPE BRETON UNIVERSITY
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NI-CAN-VEG Project for Food security

Cultivation of Ugu/Apiroko/Iroko/Agboroko

(*Telfairia occidentalis*) Fluted pumpkin

- ✓ Site selection
- ✓ Land preparation
- ✓ Planting operations
- ✓ Seed germination

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A. Site selection and land preparation: Select land that is rich in organic matter, well drained with sandy loam texture and neutral pH. Water logged soil does not support the growth and development of Ugu. Clear the land of vegetation, remove stumps and debris, mark out the plots and prepare the seeding beds. The seeding beds, are usually 4 m x 4 m or any suitable dimension. In the Fadama (wetlands), raised beds of 3 cm-10 cm or more must be used (depending on the surface water level). Ensure that the beds are well tilled, pulverized and of fine tilth. On high gradient terrain, construct seeding beds across the slope to minimize the risk for erosion.

Land preparation

B. Planting operations:

i. Seeds: Ugu produces recalcitrant seeds that cannot store for long after opening the pod (fruit). Therefore, seeds must be processed for planting immediately after opening the pod (fruit). For good plot establishment, use high quality and viable seeds. Mature seeds are extracted from mature fresh pods (fruits). The freshly extracted seeds are planted directly onto the field or may be first raised in the nursery for subsequent transplanting onto the main field.

Extracted Ugu seeds before treatment

ii. **Preparation of seeds for planting:** Carefully cut the pods at top and bottom. Thereafter, break open the pod with club or any blunt-edged object so as to prevent damage to the seeds. Carefully extract the seeds from the pulp and select the mature seeds for planting. Immature seeds are flat and without cotyledons. Therefore, they are excluded.

Extracting seeds from the pulps

iii. **Seed treatment:** The extracted seed is treated with insecticide-fungicide mixture formulated as Seed Plus 30 ws, Cibadrex, Seedrex, or Apron Plus to prevent attack by insects and fungi. Prepare the mixture by dissolving one sachet of insecticide-fungicide powder in one litre of water. The chemical is toxic, therefore care should be taken during handling. Necessary precautions during preparation and application include the use of hand gloves, plastic apron, nose and mouth guard and rain boots. The chemical container should be properly disposed of after use. Wash hands, face and feet thoroughly immediately after application.

Seeds treatment

i. **Expected leaf yield:** Females plants produce higher leaf yields than the male plant. On monocropped field, ugu could produce up to 40kg/m2.

ii. **Expected income:** N 7,460/m2/ month in the dry season or N 5,200/m2/ month in rainy season

G. Nutrition

Parts of the plant consumed are young leaves and fresh or dry seeds. The fresh leaves are good source of dietary fibre, minerals, vitamins and antioxidants.

H. Uses of Ugu

- Fresh and tender leaves are cooked and consumed as vegetable.
- The leaves are eaten as a separate dish or sauces together with other ingredients including pepper, tomato, onions, locust beans and fish or meat.
- The dried or fresh seeds could be used as condiment or thickner in vegetable soup.
- The fresh and not fully matured seeds can be boiled and eaten.
- The leaf juice extract could be mixed with milk and the recipe could be taken to improve blood level.

I. Importance of Ugu to human health

- The leaf is rich in vitamins A, B-group (folic acid, niacin thiamin, riboflavin), C and E; and minerals. It is also rich in iron and potassium, hence the contribution to growth and the maintenance of human health.
- The leaf contains high amounts of antioxidants (ascorbic acid, tocopherols and flavonoids) which fight cellular damage and help mitigate the risk of heart disease, cancer, parkinson's disease, atheroscienrosis, heart attack and Alzheimer's disease.
- It contains dietary fiber. Fiber which is an important component found only in plant foods. As part of a healthy diet, fiber helps scour bad cholesterol out of the arteries, thus lowering risk of heart disease.
- Fiber keeps digestive system running smoothly.

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NI-CAN-VEG Project for Food security

Cultivation of

Ugu/Apiroko/Iroko/Agboroko

(*Telfairia occidentalis*) Fluted pumpkin

- ✓ Field management,
- ✓ Staking and
- ✓ Importance

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D. Field Management:

i. Weeding: Remove weeds manually when necessary (avoid the use of herbicides).

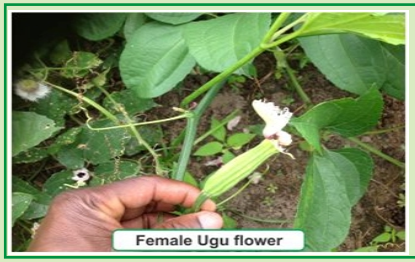
ii. Fertilizer application: Apply organic fertilizers (farm yard manure) supplemented with mineral fertilizer, based on soil test results e.g. NPK or Urea.

iii. Irrigation: Water supply is critical for realizing optimum leaf yield of Fluted pumpkin. Irrigate when there is shortage of water, especially during the dry season vegetable production. Irrigation should be done early in the morning and late in the evening.

iv. Staking: The growing plant must be staked to obtain higher and good quality leaf and fruit yields. Staking helps to minimize leaf disease infection and thereby increase income. Staking is done by using bamboo sticks or by using wood with trellis.

Staking ugu with raised platform

Staking ugu with single stand



Poor quality unstaked “ugu”

Good quality staked “ugu”

v. Flowering traits: Ugu is dioecious. This means that the male and female flowers are borne on separate plants. The female plants are often stronger with thicker stems and broader leaves than the male plants.

E. Bio-control of pests: Insect leaf defoliators and some pathogenic infections are often noticed on Fluted pumpkin. To control these pests, use neem plant extract (Azadiractha indica). The neem plant is called "dongoyaro" in southwest Nigeria. Neem leaf extract is very effective in controlling insect pests of vegetable.

i. Preparation and application of neem extracts:

Collect young neem leaves and rinse with water. Fill one kongo with fresh neem leaves (about 200 g). Add into a pot containing ten kongos of water (5L) and boil (100oC) for five minutes (caution: over boiling may render it ineffective). Allow the extract to cool and then sieve to remove the leaves. Dilute the extract at 1 part into 10 parts of water (10%) and apply to the plants. Repeat application two weeks after.

F. Harvesting: Ugu is subjected to repeated/several harvesting over a period of eight (8) months. The first harvesting is done at about 30 days after sowing. Subsequent harvestings are done on fortnightly basis (15 days interval) for about 7 months. The quality of harvested leaves often declines after 10 fortnightly harvests. Leaf harvesting is minimized at 7-12months after sowing in order to enhance fruit growth and development. At fruit maturity, the above-ground portion (shoot) often dries off while the underground "tuber" remains living. Perennial trait has been observed in Ugu. This means that the subsisting underground "tuber" could sprout and produce new plants after the first generation fruits have been harvested.

Fruting of staked ugu