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Morphology and distribution of species of the family Cucurbitaceae in Akwa Ibom State, Nigeria

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Abstract

A study of the family Cucurbitaceae in Akwa Ibom State, Nigeria, was carried out in 15 Local Government Areas in different ecological zones across the State, where collections were made between May 2017 and June 2018. A total of eleven species in nine genera were collected: *Citrullus lanatus, Citrullus mucosospermus, Cucumis sativus, Cucurbita maxima, Lagenaria siceraria, Lagenaria sphaerica, Luffa aegyptiaca, Momordica charantia, Siraitia africana, Telfairia occidentalis*, and *Trichosanthes cucumerina.* Variation in morphology were seen in the investigated species in the stem shape that were cylindrical or angular, the compound or simple types of leaves, the indumentum of the leaf, the acute or acuminate leaf apices, the yellow or white petals, the cylindrical, spherical or irregular fruit shape, the lanceolate or irregular seed shape, and the pubescent or smooth seed. Cultivated cucurbits collected were 65% of the species investigated, while 35% occurred in the wild. A survey of the Cucurbitaceae collections in the Forest Herbarium Ibadan showed only four species recorded for Akwa Ibom State, of which only *Luffa aegyptica* was identified and collected in the course of this work. More cultivation should be encouraged, as this will serve as a conservation measure for cucurbits in the State.

Introduction

Cucurbitaceae De Jussieu (1789: 393) is a fairly large family containing 95 genera and 1 000 species, which are mainly tropical or subtropical in distribution, with a few species extending into temperate climate regions (Schaefer & Renner 2011). Most of the plants in this family are annual or perennial vines, but some are woody , thorny shrubs, or trees, e.g., *Dendrosicyos* Balfour (1882: 513). Many species have large, yellow or white flowers (Morris 2009). The food plants all fall within the subfamily Cucurbitoideae and belong to two tribes: Cucurbiteae and Sicyoeae (Maynard & Maynard 2000). The genera *Cucurbita* Linnaeus (1753: 1010), *Cyclanthera* Schrader (1831: 2), and *Sechium* Browne (1756: 355) are of New World origin.

Materials and methods

Study area

This research was carried out in 15 Local Government Areas across different ecological zones of Akwa Ibom State, Nigeria. Akwa Ibom is located in the coastal southern part of the country, lying between latitudes 4°32′N and 5°33′N, and longitudes 7°25′E and 8°25′E (Government of Akwa Ibom State 2019). The 15 local Government Areas that were studied are: Ini, Essien udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono Ibom, Uyo, Ibesikpo Asutan, Nsit Atai, Nsit Ubium, Oron, Mkpat Enin, Ikot Abasi, Mbo, and Eastern Obolo (Fig. 1).

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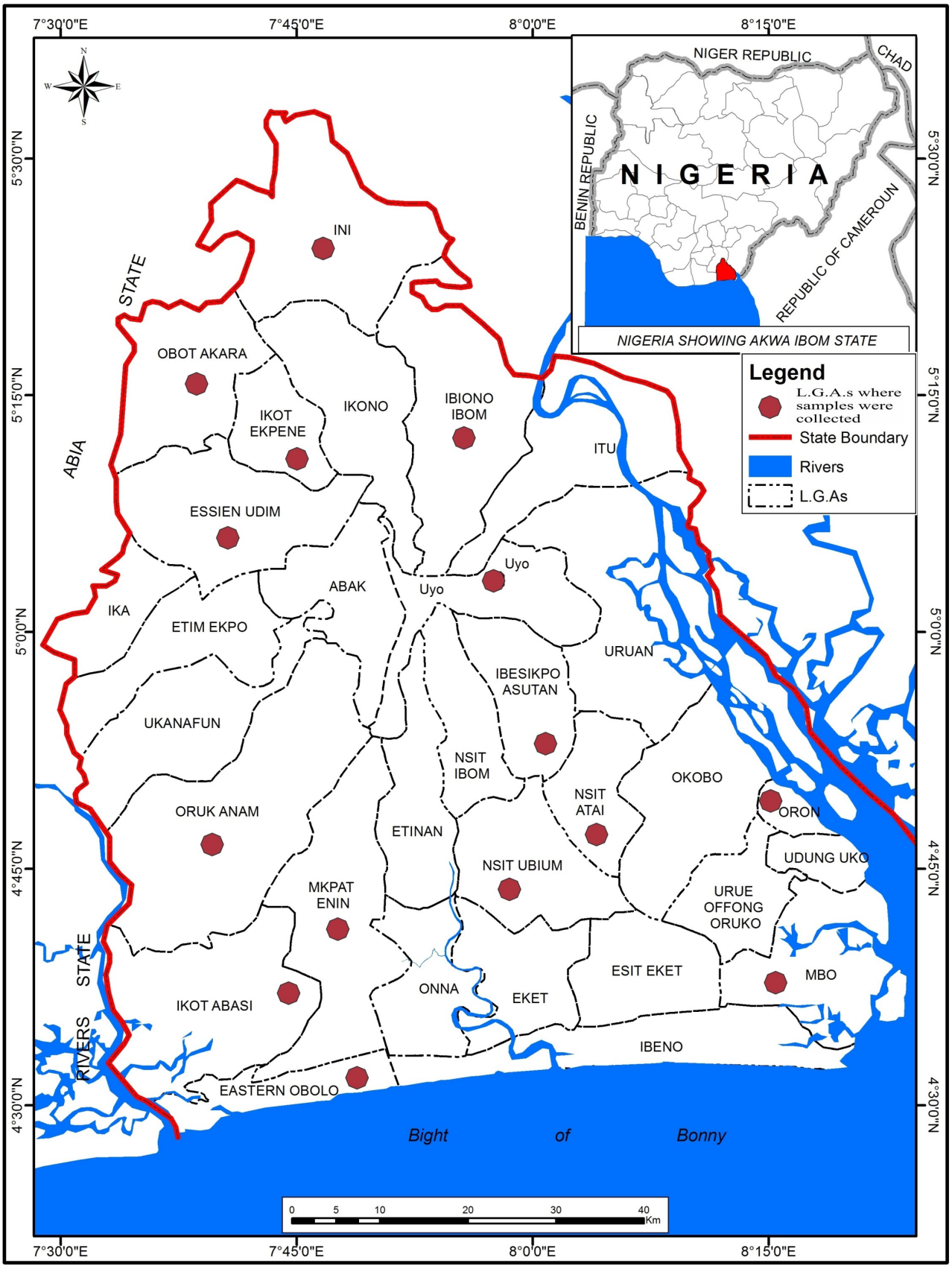

FIGURE 1. Map of the location of the study area, Akwa Ibom State in southeastern Nigeria, with the different Local Government Areas (LGA) indicated, as well as the LGAs in which samples were collected.

Collection and authentication of plant material

Plants were collected from June 2017 to May 2018, mostly at their flowering stage, to enable easy identification and to obtain complete collections for storage in the herbarium. Fresh plant material was collected from the field with a minimum of three specimens per plant, with specimen number, collection point using Global Positioning System (GPS), and date documented. Photographs of collected specimens were taken and plant drawings made. Plant material were identified and authenticated by taxonomist, Prof. Margaret Bassey, using the *Flora of West Tropical Africa* (Keay 1954). However, authentication of *Siraitia africana* (Jeffrey 1962: 361) Lu & Zhang (1984: 30) was done by Prof. Hanno Schaefer (Technical University of Munich, Germany) using genetic characterization (DNA barcoding). A minimum of three voucher specimens of each species used for this research have been deposited in the University of Uyo Herbarium (UUYH) (see Appendix 1).

Morphological parameters

Morphological descriptions of fresh plant material were made using the following characters: stem texture, stem type, stem diameter (cm), tendril type, tendril texture, leaf length (cm), leaf width (cm), leaf texture, leaf shape, leaf base, leaf margin and apex, petiole length, inflorescence type, flower colour, flower length, sepal colour, petal colour, number of stamens, fruit length (cm), fruit colour, fruit width (cm), seed colour, seed shape, seed length (cm), and seed width (cm). The terminologies of Bassey & Denise (2013) were used in the descriptions.

A simple dichotomous key to the genera of Cucurbitaceae investigated during this study was constructed using easily observed characters.

Photographs of the species were taken by the corresponding author using a smart phone camera (Gionee M3). Drawings of the species, to show the described morphological characters, were made from fresh plant material by the corresponding author.

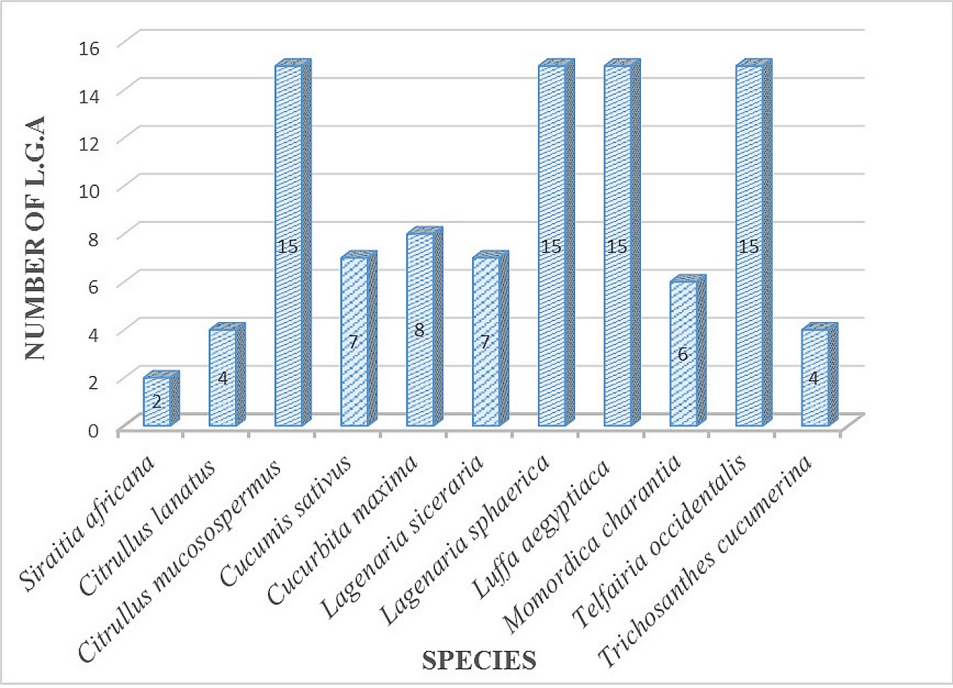

FIGURE 2. Abundance of each species with relation to the number of local government areas studied.

Vernacular names and utility of plants

The local names for the species are given in Annang and Ibibio languages. The names were obtained from the local people who use the plant species. Other common names are given in English.

Uses of plants were compiled from the testimonies of those who use them to indicate which parts are edible and how the plants are otherwise utilised.

Statistical analysis

The abundance of species was calculated using the method of Shukla & Chandel (1972), with the following formula:

$$\text{Abundance} = \frac{\text{total no. of individuals of a species in all sampling units}}{\text{number of sampling units in which a species ocurred}}$$

Species were then classified according to the classification of Shukla & Chandel (1972) into the following categories: abundant, frequent, or rare.

The abundance values gave data for creation of a bar chart (Fig. 2) to show the occurrence of species in Local Government Areas using Microsoft Excel.

Results

Species status and distribution

A total of eleven species of the family Cucurbitaceae were collected from different locations in 15 Local Government Areas of Akwa Ibom State, namely: *Citrullus lanatus* (Thunberg 1794: 13) Matsumura & Nakai (1916: 30, no. 854), *Citrullus mucosospermus* (Fursa 1972: 38) Fursa (1983: 111), *Cucumis sativus* Linnaeus (1753: 1012), *Cucurbita maxima* Duchesne (1786: 7), *Lagenaria siceraria* (Molina 1782: 133) Standley (1930: 435), *Lagenaria sphaerica* (Sond. in Harvey & Sonder 1862: 490) Meyer (1843: 197), *Luffa aegyptiaca* Miller (1768: pages unnumbered), *Momordica charantia* Linnaeus (1753: 1009), *Siraitia africana*, *Telfairia occidentalis* Hooker (1871: 524), and *Trichosanthes cucumerina* Linnaeus (1753: 1008) (see Tables 1 & 2).

On the basis of status, four out of eleven of the collected samples were wild species (36% of species investigated): *L. sphaerica*, *L. aegyptiaca*, *M. charantia*, and *S. africana*; while eight of the species were cultivated: *C. mucosospermus*, *C. lanatus*, *C. sativus*, *C. maxima*, *L. siceraria*, *M. charantia*, *T. occidentalis*, and *T. cucumerina*. The bittergourd, *Momordica charantia*, occurs as both a cultivated and a wild species (Table 1).

TABLE 1. Species of the family Cucurbitaceae in Akwa Ibom State, Nigeria, their status and uses

	Species name	Local name in Annang and Ibibio	Status	**Uses**
1	*Citrullus lanatus*	Ikpan Mbakara, Ikon mbakara	Cultivated	► Fruits are edible
2	*Citrullus mucosospermus*	Ikpan, Ikon	Cultivated	► Seed is a well known thickener in soups
3	*Cucumis sativus*	Okokon	Cultivated	► Fruit and seed are edible
4	*Cucurbita maxima*	Ndise	Cultivated	► Fruits and leaves are cooked and consumed by rural dwellers
5	*Lagenaria siceraria*	Iko, Ikim, Ekikob, Ukpok	Cultivated	► Dry fruit case is used as wine cup, for decoration in local events
6	*Lagenaria sphaerica*	Ndise Ikot	Wild	► Fruit are used to play football by children in rural areas ► Leaves are used as fodder
7	*Luffa aegyptiaca*	Akusa, Kusa	Wild	► Dry pulp is used as sponge ► Leaves are used as fodder for rabbits
8	*Momordica charantia*	Ikpan Ekpo, Ikon Ekpo	Cultivated/ Wild	► Leaf decoction is used in treatment of internal heat
9	*Siraitia africana*	Ndise Ekpo	Wild	► Leaves are used as mulching material
10	*Telfairia occidentalis*	Nkong ubong, Ikong	Cultivated	► Leaves and fruit are eaten as vegetable
11	*Trichosanthes cucumerina*	Tomatos Uduk ikot	Cultivated	► Ripe fruit are used like tomatoes

Citrullus mucosospermus, *L. sphaerica*, *L. aegyptiaca*, and *T. occidentalis* were the most widespread of the species and were found in all 15 Local Government Areas (L.G.A.), followed by *C. maxima* (eight L.G.A.), then *C. sativus* and *L. siceraria* (each in seven L.G.A.), and *M. charantia* (six L.G.A.). *Citrullus lanatus* and *T. cucumerina* were both found in four L.G.A. The most rare of the species, *S. africana*, were found in only two L.G.A. (see Fig. 2 and Table 2). For ease of reference the percentage of sampling plots in which each species was found, as well as its abundance classification, is given in the morphological description section.

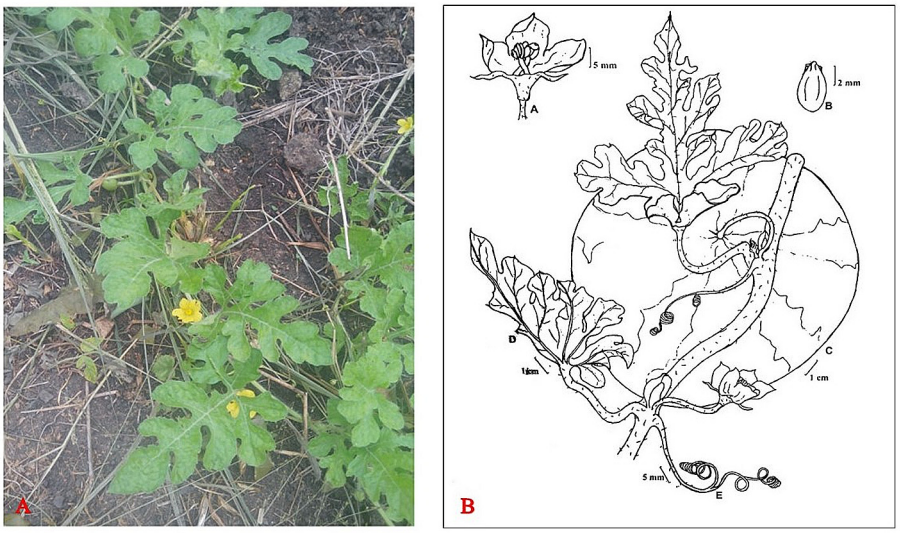

FIGURE 3. *Citrullus lanatus*. A. Flowering plant in habitat. B. Morphological features showing (A) Flower section. (B) Seed. (C) Fruit. (D) Leaf. (E) Tendrils.

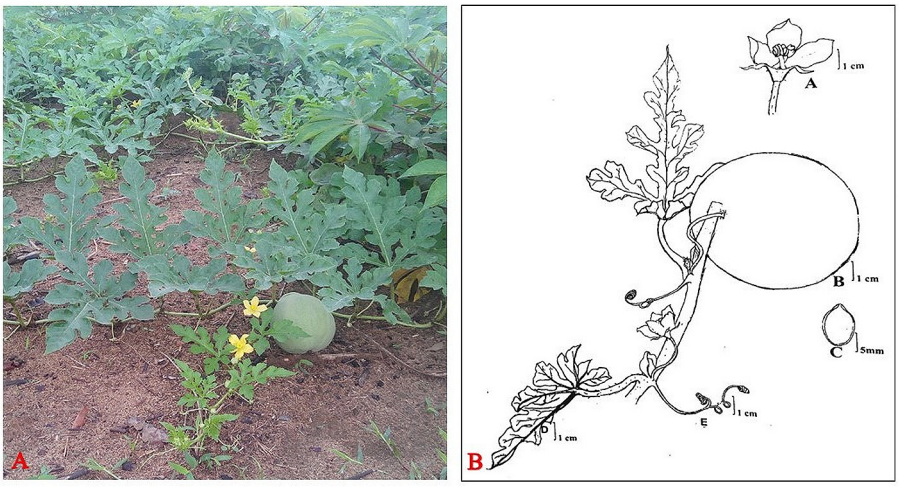

FIGURE 4. *Citrullus mucosospermus*. A. Fruiting plant in habitat. B. Morphological features showing (A) Flower section. (B) Fruit. (C) Seed. (D) Leaf. (E) Tendrils.

Uses

The species collected were useful to the rural dwellers in the following ways (Table 1):

Edibles:—The seeds of *C. lanatus*, *C. mucosospermus*, *C. sativus*, *C. maxima*, and *T. occidentalis* are edible and are either eaten raw alongside the fruits or cooked as a vegetable. Fruits of *C. maxima, T. occidentalis*, and *T. cucmerina* are cooked and eaten. They serve as common delicacies among the locals. Leaves of *C. maxima* and *T. occidentalis* are eaten as a vegetable among the locals.

Medicinal:—A leaf decoction of *M. charantia* is used in the treatment of fever.

Other uses:—Fruits of *L. siceraria* are used as cups when dried. Fresh fruits of *L. sphaerica* are used as a football by the children in rural areas. Dry pulp from the fruits of *L. aegyptiaca* is used as sponge by the local dwellers. Leaves of *S. africana* are used for mulching, especially by farmers who cultivate yam.

Morphology

Morphological characters were variable among the species (see Table 3 & 4). Stem shape was angular in almost all the species collected, but was cylindrical in *L. sphaerica.* Glabrous stem texture was found in *L. sphaerica* and *T occidentalis,* while stem texture in *C. lanatus*, *C. mucosospermus*, *C. sativus*, *C. maxima*, *L. siceraria*, *L. aegyptiaca*, *M. charantia*, *T. cucmerina*, and *S. africana* was pubescent. Tendrils were unbranched in *C. sativus* and *M. charantia*, bifid in *C. lanatus*, *C. mucosospermus*, *C. maxima*, *L. siceraria*, *L. sphaerica*, and *S. africana*, and trifid in *L. aegyptiaca*, *T. occidentalis*, and *T. cucumerina.*

Leaves were simple in all species except in *T. occidentalis*, where it was compound, and phyllotaxy in all the species was alternate. Leaf apex was acute in *C. sativus*, *C. maxima*, *L. sphaerica*, *L. aegyptiaca*, *S. africana*, *T. occidentalis*, and *T. cucumerina*, and acuminate in *C. lanatus*, *C. mucosospermus*, and *M. charantia.* Leaves were palmate in all the species, with palmately lobed margins found in all species, mixed with dentate in *L. siceraria*, *L. sphaerica*, *L. aegyptiaca*, *S. africana*, and *T. cucumerina.* Undulate margins were found in *M. charantia*, serrate margins in *C. lanatus*, *C. mucosospermus*, and *T. occidentalis*, and serrulate margins in *C. maxima.* Leaf texture was scabrid in *L. sphaerica*, *L. siceraria*, *L. aegyptiaca*, glabrous in *M. charantia*, *T. occidentalis*, *T. cucumerina*, pubescent in *C. lanatus*, *C. mucosospermus*, and *C. sativus*, and villous in *C. maxima* and *S. africana.*

Inflorescences were cymose in *L. sphaerica* and *L. aegyptiaca,* racemose in *L. aegyptiaca* and *T. occidentalis*, and solitary in *C. lanatus*, *C. mucosospermus*, *C. sativus*, *C. maxima*, *L. siceraria*, *M. charantia*, *T. cucmerina*, and *S. africana*. Flowers lacked bracts in all species except in *C. sativus*, *M. charantia*, and *T. occidentalis.* Sepal colour was green in all species, Petal colour was white in *L. siceraria*, *L. sphaerica*, *T. occidentalis* and *T. cucumerina* and yellow in *C. lanatus*, *C. mucosospermus*, *C. sativus*, *C. maxima*, *L. aegyptiaca*, *M. charantia*, and *S. africana*.

Fruits were spherical in *C. lanatus*, *C. mucosospermus*, *C. maxima*, *L. sphaerica*, and *S. africana*, cylindrical in *C. sativus*, *L. siceraria*, *L. aegyptiaca*, *T. occidentallis*, and *T. cucmerina* and irregular in *M. charantia.* Seeds were flat in *C. lanatus*, *C. mucosospermus*, *C. maxima*, *L. sphaerica*, and *L. aegyptiaca*, irregular in *L. siceraria* and *T. cucumerina*, and lanceolate in *C. sativus*, *M. charantia*, and *S. africana* and ovate in *T. occcidentalis.*

Morphological descriptions

1. *Citrullus lanatus* (Thunb.) Matsumura & Nakai (1916: 30, no. 854) (Fig. 3)

Basionym:—*Momordica lanata* Thunberg (1794: 13).

Synonyms:—*Cucumis citrullus* Ser. in De Candolle (1828: 301).
Citrullus vulgaris Schrad. in Ecklon & Zeyher (1836: 279).
Citrullus edulis Spach (1838: 214).

Local Name:—Ikpan mbakara (Annang), Ikon mbakara (Ibibio).

Common Name:—Watermelon.

Habitat:—Cultivated farmland.

Description:—Herb, trailing, can be pendant. *Stem* herbaceous, trailing, angular, pubescent, 0.5–0.7 cm diam.; tendrils 2-fid. *Leaves* simple, alternately arranged, petiolate, glabrous, palmately lobed with 5 lobes, green; petiole cylindrical, herbaceous, 4–7 cm long. *Inflorescence* solitary or axillary, emanating from leaf node, pedunculate, peduncle 2–3 cm long, pubescent. *Flowers* pentamerous, calyx with 5 sepals, pubescent; corolla with 5 petals, yellow, 1.5–2 cm long. *Fruit* pepos, circular, cylindrical, irregular, green, sometimes with patches of deep green or deep green strands, with many seeds borne in reddish pulp. *Seed* flat, black, 0.8 × 0.4 cm.

Location in Akwa Ibom:—Essien Udim, Oruk Anam, Uyo, and Ibesikpo Asutan.

Abundance:—It existed in 27% of the sampling points and was rare.

2. *Citrullus mucosospermus* (T.B.Fursa) Fursa (1983: 111) (Fig. 4)

Basionym:—*Citrillus lanatus* subsp. *mucosospermus* Fursa (1972: 38).

Local Name:—Ikpan (Annang), Ikon (Ibibio).

Common Name:—Melon.

Habitat:—Cultivated farmland.

Description:—Herb, trailing, can be pendant. *Stem* herbaceous, trailing, angular, pubescent, 0.5–0.7 cm diam.; tendrils 2-fid. *Leaves* simple, alternately arranged, petiolate, glabrous, palmately lobed with 5 lobes, green; petiole cylindrical, herbaceous, 4–7 cm long. *Inflorescence* solitary, axillary, emanating from leaf node, pedunculate, peduncle 2–3 cm long, pubescent. *Flowers* pentamerous; calyx with 5 sepals, pubescent; corolla with 5 petals, yellow, 1.5–2.0 cm long. *Fruit* pepos, circular, cylindrical, irregular, green, sometimes with patches of deep green or deep green strands, many seeded. *Seed* flat, 1.0–1.5 × 0.7–0.9 cm.

Location in Akwa Ibom:—Ini, Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Uyo, Ibesikpo Asutan, Nsit Atai, Nsit Ubium, Mkpat Enin, Ikot Abasi, Oron, Mbo, and Eastern Obolo.

Abundance:—It existed in 100% of the sampling points, where it was abundant in 53%, frequent in 27%, and rare in 20% of the sampling areas.

3. *Cucumis sativus* Linnaeus (1753: 1012) (Fig. 5)

Local Name:—Okokon (Annang and Ibibio).

Common Name:—Cucumber.

Habitat:—Cultivated farmland.

Description:—Herb, trailing by means of unbranched tendrils; monoecious. *Stem* herbaceous, pubescent, angular, 0.5–0.7 cm diam.; tendrils unbranched, ± 30–40 cm long. *Leaves* simple, green, alternately arranged, petiolate, palmate, acuminate, serrate, pubescent adaxially, scabrid abaxially, 4–15 × 2–25 cm; petiole cylindrical, green, ± 5–11 cm long. *Inflorescence* axillary, pedunculate. *Flowers* pentamerous, pedicellate, bracteate; sepals light green, pubescent; petals yellow, fused towards base, 2 × 1.8 cm, glabrous on upper surface, pubescent on lower surface; pedicel cylindrical, pubescent, 1.5 cm long. *Fruit* cylindrical, pubescent when young, turns glabrous with age, 5–28 × 2–6 cm, green, with patches of yellow and white when ripe, many seeded. *Seed* lanceolate, milky, 0.4 × 0.1 cm.

Location in Akwa Ibom:—Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ikot Obong, Ibiono, Uyo, and Nsit Atai.

Abundance:—It existed in 47% of the sampling points, where it was frequent in 20% and rare in 27%.

4. *Cucurbita maxima* Duchesne (1786: 7) (Fig. 6)

Synonyms:—*Pepo maximus* Petermann (1838: 562).

Local Name:—Ndise (Annang and Ibibio).

Common Name:—Pumpkin.

Habitat:—Cultivated farmland. It can grow and proliferate well in the midst of other cucurbits.

Description:—Herb, climbing and trailing. *Stem* herbaceous, climbing, angular, villous, 0.4–0.7 cm diam.; tendrils 2-fid, very hairy. *Leaves* simple, alternately arranged, petiolate, palmately lobed with 3 joined lobes, broadly acute, serrulate, villous, bright green; petiole cylindrical, herbaceous, green, ± 6–8 cm long. *Inflorescence* solitary or axillary, pedunculate; peduncle ± 4–5 cm long. *Flowers* pentamerous, corolla with fused petals forming tube 3–4 cm long, smooth, embedding the androecium. *Fruit* pepos, round or circular, hairy, green when fresh, brownish when dry, many seeded. *Seed* flat, chalk-like, 0.7–0.9 × 0.4–0.5 cm.

Location in Akwa Ibom:—Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Uyo, Ibesikpo Asutan, and Mkpat Enin.

Abundance:—This species existed in 52% of the sampling points and was rare in these sampling points.

5. *Lagenaria siceraria* (Molina) Standley (1930: 435) (Fig. 7)

Basionym:—*Cucurbita siceraria* Molina (1782: 133).

Synonyms:—*Cucurbita lagenaria* Linnaeus (1753: 1010).

Lagenaria vulgaris Seringe (1825: 16).

Local Name:—Iko ukod (Annang), Ukpok (Ibibio).

Common Name:—Bottle gourd.

Habitat:—Cultivated farmland.

TABLE 2. Abundance of species of the family Cucurbitaceae in Akwa Ibom State, Nigeria

	Species	Obot Akara	Ikot Ekpene	Essien Udim	Ini	Oruk Anam	Ibiono	Uyo	Ibesikpo Asutan	Nsit Atai	Nsit Ubium	Oron	Mkpat Enin	Ikot Abasi	Mbo	Eastern Obolo	Percentage presence
1	*Citrullus lanatus*	-	-	+	-	+	-	+	+	-	-	-	-	-	-	-	4/15 x 100 = 27%
2	*Citrullus mucosospermus*	+++	+++	+++	+++	+++	+++	++	+++	++	+++	+	++	+	++	+	15/15 x 100 = 100%
3	*Cucumis sativus*	+	+	++	-	++	+	++	-	+	-	-	-	-	-	-	7/15 x 100 = 47%
4	*Cucubita maxima*	+	+	+	-	+	+	-	+	-	-	-	+	+	-	-	8/15 x 100 = 53%
5	*Lagenaria siceraria*	+	+	+	-	+	+	-	+	-	-	-	+	-	-	+	8/15 x 100 = 53%
6	*Lagenaria sphaerica*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	++	+++	++	++	+	15/15 x 100 = 100%
7	*Luffa aegyptiaca*	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	++	+++	++	++	+	15/15 x 100 =100%
8	*Momordica charantia*	++	-	-	-	++	-	++	++	-	-	-	-	++	-	-	5/15 x 100 = 33%
9	*Siraitia africana*	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	2/15 x 100 = 13%
10	*Telfairia occidentalis*	+++	+++	+++	+++	+++	+++	++	+++	+++	+++	++	+++	++	++	++	15/15 x 100 = 100%
11	*Trichosanthes cucumerina*	+	+	-	-	-	-	+	-	-	-	-	+	-	-	-	4/15 x 100 = 27%

Key: +++ (Abundant: 21–100 individuals per sampling point); ++ (Frequent: 6–20 individuals per sampling point); + (Rare: 1–5 individuals per sampling point); - (Absent) (according to classification by Shukla & Chandel 1972)

TABLE 3. Summary of morphological characters investigated

CHARACTERS	*Citrullus lanatus*	*Citrullus mucosospermus*	*Cucumis sativus*	*Cucurbita maxima*	*Lagenaria siceraria*	*Lagenaria sphaerica*	*Luffa aegyptiaca*	*Momordica charantia*	*Siraitia africana*	*Telfairia Occidentalis*	*Trichosanthes cucumerina*
Stem											
Shape	Angular	Angular	Angular	Angular	Angular	Cylindrical, angular	Angular	Angular	Angular	Angular	Angular
Indumentum	Pubescent	Pubescent	Pubescent	Pubescent	Pubescent	Glabrous	Pubescent	Pubescent	Pubescent	Glabrous	Pubescent
Tendril											
Number of branches	2	2	1	2	2	2	3–4	1	2	3	3
Leaves											
Type	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Simple	Compound	Simple
Phyllotaxy	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate	Alternate
Petiole length (cm)	4–7	4–7	5–11	6–8	3–5	3–5	4–17	2–5	5–6	4–8	4–15
Shape	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate	Palmate
Number of lobes	5	5	3	3	3–5	5	5	3	3	3–5	3–5
Apex	Acuminate	Acuminate	Acute	Acute	Acute	Acute	Acute	Acuminate	Acute	Acute	Acute
Margin	Multilobed/ serrate	Multilobed/ serrate	Palmately lobed/serrate	Palmately lobed/ serrulate	Palmately lobed/ dentate	Palmately lobed/ dentate	Palmately lobed/ dentate	Multilobed/ undulate	Palmately lobed/ dentate	Palmately lobed/ serrate	Multilobed/ dentate
Surface texture	Pubescent	Pubescent	Pubescent	Villous	Scabrid	Scabrid	Scabrid	Glabrous	Villous	Glabrous	Glabrous
Inflorescence type	Solitary	Solitary	Solitary	Solitary	Solitary	Cymose	Cymose to raceme	Solitary	Solitary	Raceme	Solitary
Flowers											
Bracts	Absent	Absent	Present	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent
Petal colour	Yellow	Yellow	Yellow	Yellow	White	White	Yellow	Yellow	Yellow	White	White
Sepal colour	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Fruit											
Shape	Spherical	Spherical, cylindrical	Cylindrical	Spherical	Cylindrical, irregular	Spherical	Cylindrical/ oblong	Irregular	Spherical	Cylindrical	Cylindrical
Colour	Green	Green	Green	Green	Green	Green	Green	Green	Chalky	White	Green
Length (cm)	10–25	8–20	15–30	6–8	6–15	6–7	7–11	1.5–3.5	3–5	20–120	30–150
Width (cm)	20–24	8–29	5–11	10–17	6–14	5–8	4–5	1–3	2–3	15–35	4–6
Seed											
Shape	Flat	Flat	Lanceolate	Flat	Irregularly ridged	Flat	Flat	Lanceolate	Lanceolate	Ovate	Irregular

TABLE 4. Mean (±Standard Error of Mean) of quantitative traits of the family Cucurbitaceae in Akwa Ibom State, Nigeria

	Species	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Flower length (cm)	No. of sepals	No. of petals	No. of tendril branches	Fruit length (cm)	Fruit width (cm)	Seed length (cm)	Seed width (cm)
1	*Citrullus lanatus*	13±2.00	15±0.50	5.5±.2.50	2±0.10	5	5	3	25±5.00	30±1.00	0.4±0.15	0.3±0.10
2	*Citrullus mucosospermus*	13±2.00	15±2.00	5.5±2.50	1.75±0.25	5	5	2	15±5.00	20±5.00	0.5±0.05	0.4±0.10
3	*Cucumis sativus*	9.5±4.00	13.5±2.50	8±2.00	2±0.50	5	5	1	26±10.00	7.5±2.50	0.25±0.15	0.1±0.01
4	*Cucurbita maxima*	18±4.00	20±3.50	7±4.50	3.5±0.50	5	5	3	7±1.00	16±2.00	0.4±0.10	0.35±0.15
5	*Lagenaria siceraria*	10±2.20	12±2.10	3±2.50	3±0.50	5	5	2	10±6.00	5±0.50	0.8±0.010	0.35±0.25
6	*Lagenaria sphaerica*	11±2.00	13±1.50	4±1.50	3.5±0.50	5	5	2	6.5±1.50	6±1.00	0.6±0.10	0.4±0.10
7	*Luffa aegyptiaca*	12.6±5.20	14±5.00	10.5±4.00	3.5±0.50	5	5	4	9±5.00	4.5±0.50	0.4±0.010	0.45±0.15
8	*Momordica charantia*	5±1.00	6±2.00	3.5±1.00	2.5±0.50	5	5	1	2.5±0.50	1.5±0.50	0.35±0.15	0.2±0.10
9	*Saraitia africana*	12.25±0.50	12.5±1.50	5.5±1.00	2±0.50	5	5	2	4±1.00	2.5±0.50	0.2±0.10	0.15±0.50
10	*Telfairia occidentalis*	17.5±2.00	8±2.50	6±2.00	2±0.20	5	5	3	85±25.00	28±5.50	2.5±1.50	3±1.50
11	*Trichosanthes cucumerina*	12.5±1.10	9.5±2.00	9.5±2.50	1.5±0.20	5	5	3	100±20.00	5±1.00	0.9±0.10	0.5±0.20

Description:—Herb, climbing and trailing by means of tendrils; monoecious. *Stem* herbaceous, climbing, angular, pubescent, 0.2–0.3 cm diam.; tendrils 2-fid, spirally coiled just above branching point. *Leaves* simple, alternately arranged, petiolate, exstipulate, scabrid, palmately lobed, deep green, apex acute, dentate, 4–15 × 5–15 cm; petiole cylindrical, 3–5 cm long, herbaceous, pubescent. *Inflorescence* axillary. *Male flowers* calyx tubular; corolla white, with 5 free petals, slightly hairy. *Fruit* round, cylindrical, sometimes irregular in shape, 5–15 cm diam., pedunculate, smooth, green.

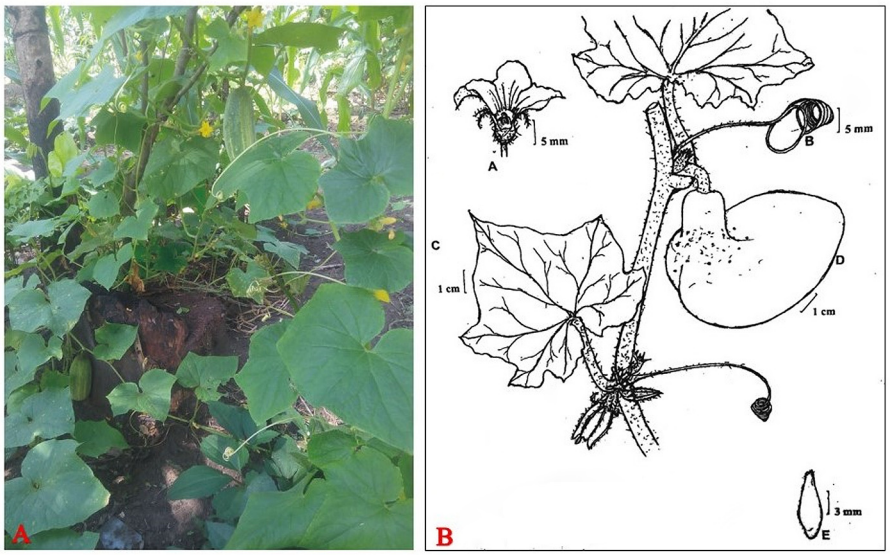

FIGURE 5. *Cucumis sativus*. A. Fruiting plant in habitat. B. Morphological features showing (A) Flower section. (B) Tendrils. (C) Leaf. (D) Fruit. (E) Seed.

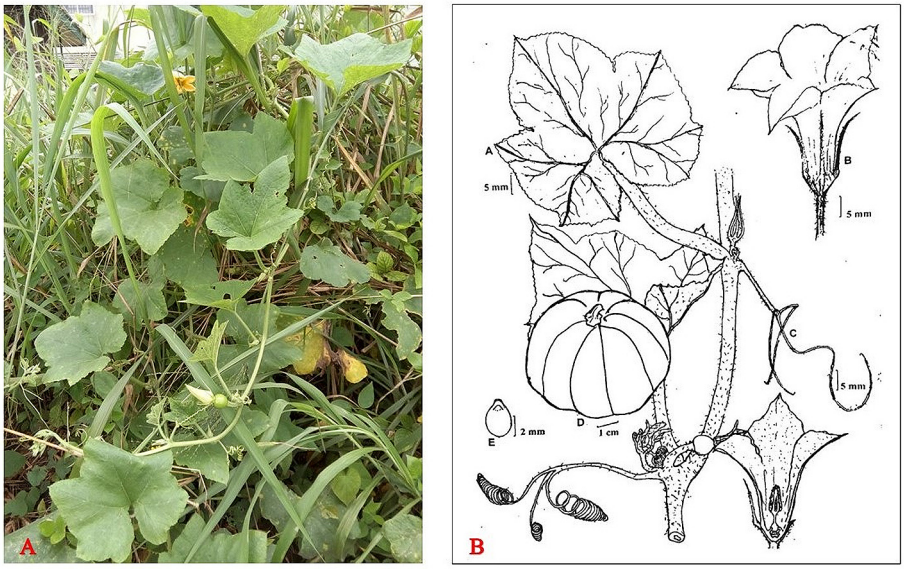

FIGURE 6. *Cucurbita maxima*. A. Plant in habitat with wilted flower and young fruit. B. Morphological features showing (A) Leaf. (B) Flower. (C) Tendrils. (D) Fruit. (E) Seed.

Location in Akwa Ibom:—Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Ibesikpo Asutan, Mkpat Enin, and Eastern Obolo.

Abundance:—It existed in 47% of the sampling areas and was rare in these areas.

6. *Lagenaria sphaerica* (Sond.) Meyer (1843: 197) (Fig. 8)

Basionym:—*Luffa sphaerica* Sond. in Harvey & Sonder (1862: 490); *Homotypic synonym*:—*Sphaerosicyos sphaericus* (Sond) Cogn. in De Candolle & De Candolle (1881: 466).

Synonyms:—*Adenopus breviflorus* Benth. in Hooker (1849: 372); *Lagenaria breviflora* (Benth.) Roberty (1954: 795).

Local name:—Ndise ikot (Annang and Ibibio).

Common name:—Wild melon.

Habitat:—Roadsides, fallow bush, cultivated land.

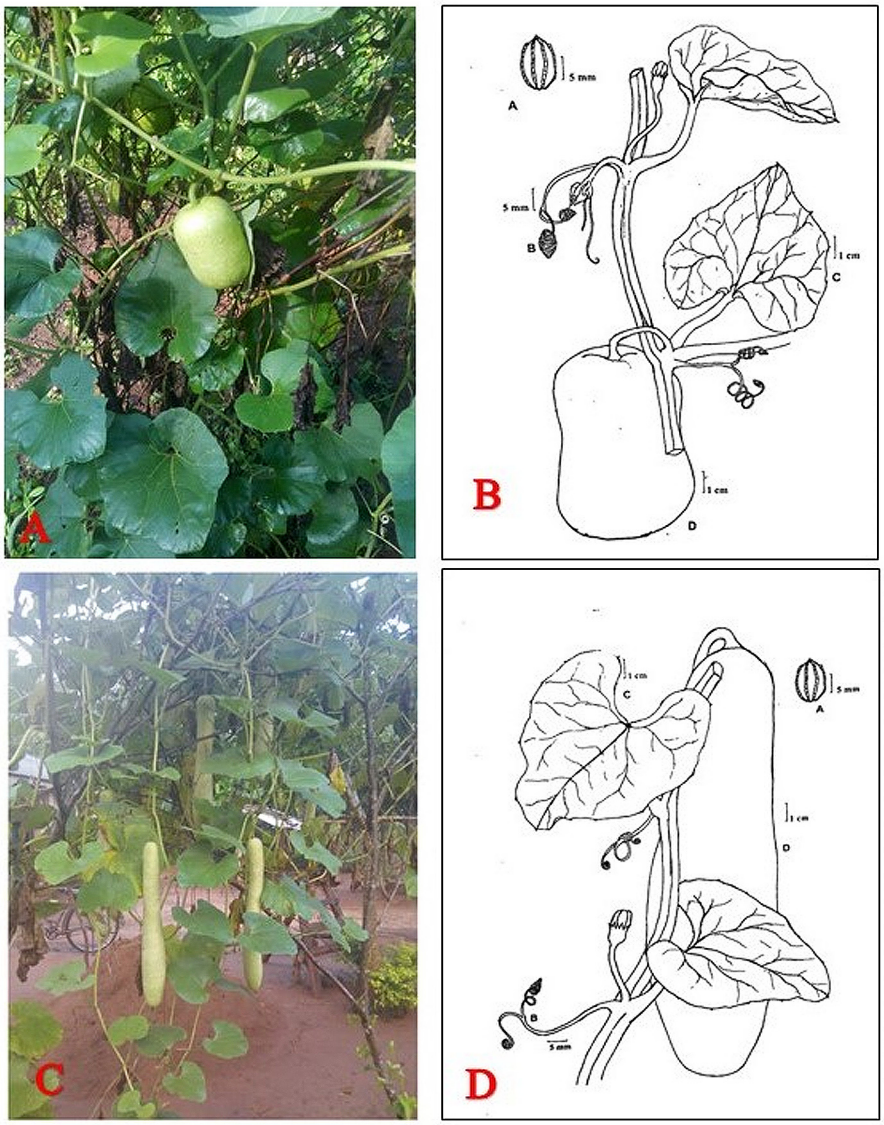

FIGURE 7. Two forms of *Lagenaria siceraria*. A. & C. Fruiting plants in habitat. B. & D. Morphological features showing (A) Seed. (B) Tendrils. (C) Leaf. (D) Fruit.

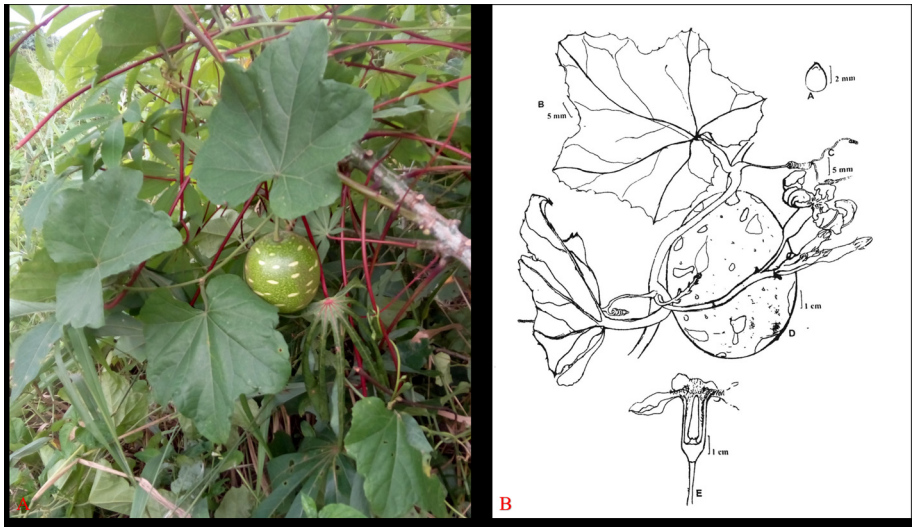

FIGURE 8. *Lagenaria sphaerica*. A. Fruiting plant in habitat. B. Morphological features showing (A) Seed. (B) Leaf. (C) Tendrils. (D) Fruit. (E) Longitudinal section of flower.

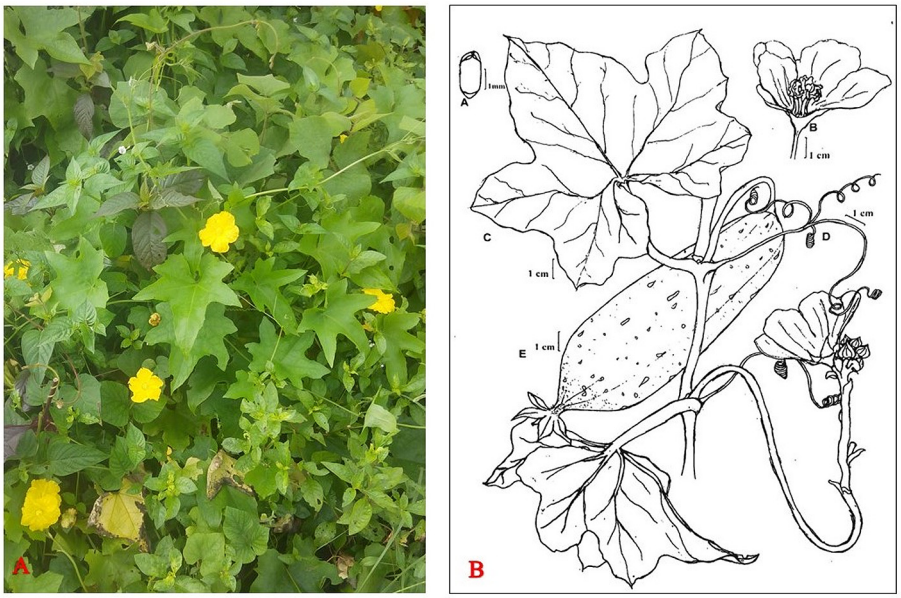

FIGURE 9. *Luffa aegyptica*. A. Flowering plant in habitat. B. Morphological features showing (A) Seed. (B) Flower section. (C) Leaf. (D) Tendrils. (E) Fruit.

Description:—Herb, climbing by means of tendrils, up to 50m high; monoecious. *Stem* herbaceous, climbing, cylindrical, scabrid, 0.2–0.3 cm diam.; tendrils bifid, spirally coiled just above branching point. *Leaves* simple, alternately arranged, petiolate, exstipulate, scabrid, palmately lobed, deep green, dentate to undulate, apex acute, 7–15 × 6–20 cm; petiole cylindrical, 3–5 cm long, herbaceous, smooth. *Inflorescence* cymose; male flowers with tubular calyx, corolla white with 5 free petals, slightly hairy with patches of green towards calyx tube. *Fruit* round pepos, ± 7–5 cm diam., pedunculate, smooth, green with white and yellow patches all over, many seeded. *Seed* flat, 1.0–1.4 × 0.6–0.8 cm.

Location in Akwa Ibom:—Ini, Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Uyo, Ibesikpo Asutan, Nsit Atai, Nsit Ubium, Mkpat Enin, Ikot Abasi, Oron, Mbo, and Eastern Obolo.

Abundance:—It existed in 100% of the sampling points, and was abundant in 73%, frequent in 20%, and rare in 7% of sampling plots.

7. *Luffa aegyptiaca* Miller (1768: pages unnumbered) (Fig. 9)

Synonyms:—*Momordica cylindrica* Linnaeus (1753: 1009).

Momordica luffa Linnaeus (1753: 1009).

Local name:—Akusa (Annang), Kusa (Ibibio).

Common name:—Sponge gourd.

Habitat:—Waste dump sites, uncompleted buildings, unpainted fences, roadsides, fallow bush.

Description:—Herb, trailing and climbing; moenoecious. *Stem* herbaceous, climbing, pubescent, angular, 0.3–0.6 cm diam.; tendrils 3- to 4-fid, spirally coiled. *Leaves* simple, alternately arranged, petiolate, hairy on both surfaces, palmately lobed with 5 joined lobes, green, apex acute, margin dentate, 8.2–17 × 9–19 cm; petiole cylindrical, herbaceous, 4–8 cm long, hairy. *Inflorescence* racemose for male flowers with about 5–20 flower buds, solitary for female flowers; pedunculate, peduncle 10–31 cm long; *pedicel* 1.5–2.0 cm long; flowers 3 × 8–9 cm; calyx with 5 green, free sepals; corolla with 5 yellow, free imbricate petals, pubescent on both surfaces, 3–5 × 2–4 cm, androecium parts 5. *Fruit* pepos, cylindrical, green when fresh, brown and paper-like when dry, produces sponge bearing many seeds. *Seed* flat, black.

Location in Akwa Ibom:—Ini, Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Uyo, Ibesikpo Asutan, Nsit Atai, Nsit Ubium, Mkpat Enin, Ikot Abasi, Oron, Mbo, and Eastern Obolo.

Abundance:—It existed in 100% of the sampling areas, where it was abundant in 73%, frequent in 21%, and rare in 6% of the sampling areas.

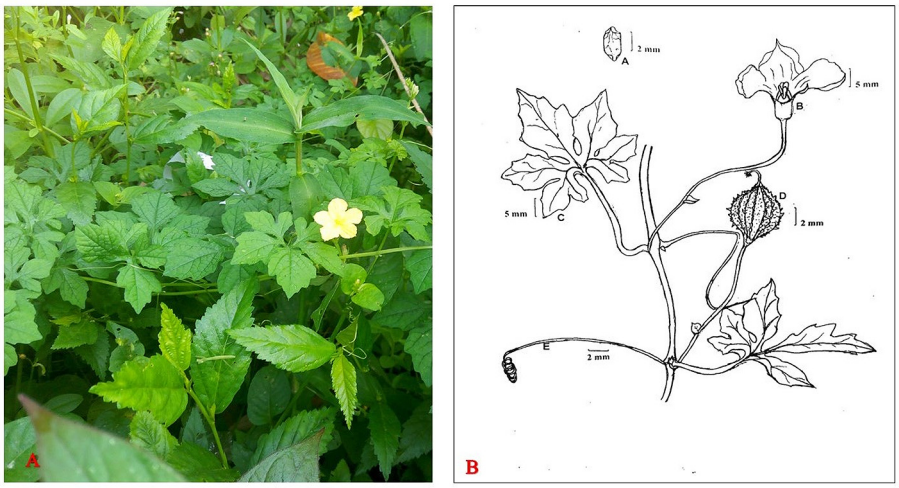

FIGURE 10. *Momordica charantia*. A. Flowering plant in habitat. B. Morphological features showing (A) Seed. (B) Flower section. (C) Leaf. (D) Fruit. (E) Tendrils.

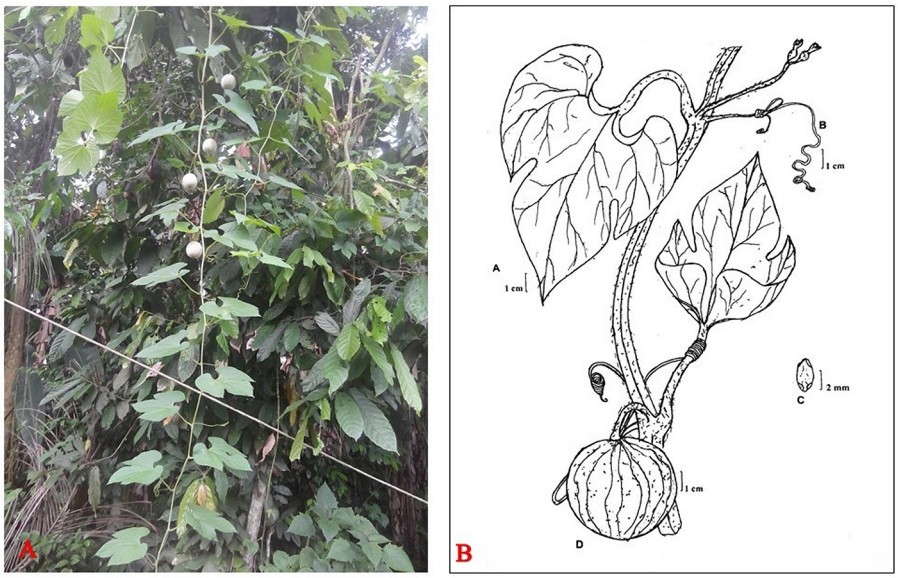

FIGURE 11. *Siraitia africana*. A. Fruiting plant in habitat. B. Morphological features showing (A) Leaf. (B) Tendrils. (C) Seed. (D) Fruit.

8. *Momordica charantia* Linnaeus (1753: 1009) (Fig. 10)

Synonyms:—*Sicyos fauriei* Léveillé (1911: 150).

Cucumis intermedius Roemer (1846: 80).

Cucumis argyi Léveillé (1916: 8).

Local Name:—Ikpan Ekpo (Annang), Ikon Ekpo (Ibibio).

Common Name:—Bitter gourd.

Habitat:—Roadsides, dumpsites, fallow bush.

Description:—Herb, trailing and climbing means of unbranched tendrils; monoecious. *Stem* herbaceous, climbing, pubescent, angular, 0.1 cm diam.; tendrils unbranched. *Leaves* simple, alternately arranged, petiolate, acute, undulate, glabrous, palmately lobed with 5 lobes joined towards leaf base, 4–6 × 5–7 cm; petiole herbaceous, cylindrical, glabrous, 2.5 cm long. *Inflorescence* solitary, pedicellate, pedicel 4–7 cm long, 0.1–0.2 cm diam.; calyx with 5 sepals, green; corolla with 5 petals, yellow, glabrous. *Fruit* berry with irregular surface, short round, green when unripe, orange to yellow when ripe, 4–6 × 2–4 cm, with many seeds (± 15–25). *Seed* flat, blackish, surrounded by red aril, 0.8–1.0 × 0.5 cm.

Location in Akwa Ibom:—Obot Akara, Uyo, Ibesikpo Asutan, and Ikot Abasi.

Abundance:—It existed in 40% of the sampling areas and was frequent in all these sampling areas.

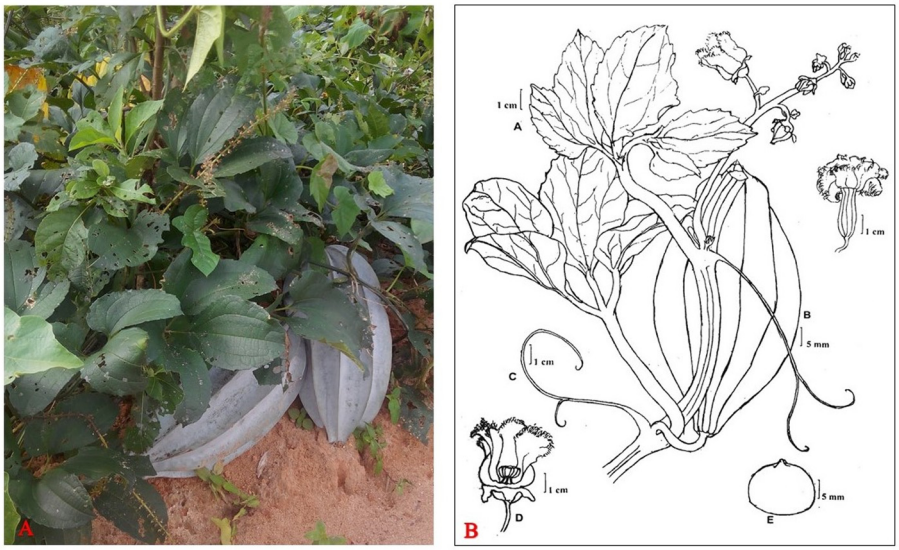

FIGURE 12. *Telfairia occidentalis*. A. Fruiting plant in habitat. B. Morphological features showing (A) Leaf. (B) Fruit. (C) Tendrils. (D) Flower section. (E) Seed.

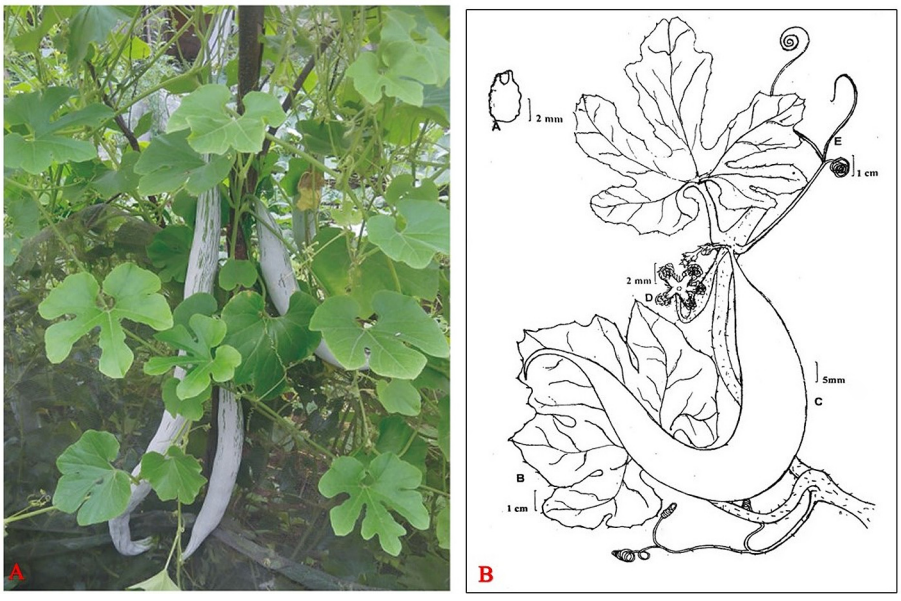

FIGURE 13. *Trichosanthes cucumerina*. A. Fruiting plant in habitat. B. Morphological features showing (A) Seed. (B) Leaf. (C) Fruit. (D) Flower. (E) Tendrils.

9. *Siraitia africana* (C.Jeffrey) Lu & Zhang (1984: 30) (Fig. 11)

Basionym:—*Thladiantha africana* Jeffrey (1962: 361); *Homotypic synonym*:—*Microlagenaria africana* (C.Jeffrey) A.M.Lu & J.Q.Li in Li (1993: 53).

Local Name:—Ndise Ekpo (Annang and Ibibio).

Common Name:—Wild pumkin.

Habitat:—Fallow bush.

Description:—Herb, trailing by means of tendrils, could also be pendant hanging from height up to 20 m high. *Stem* pubescent, angular, 0.4–0.5 cm diam.; tendrils 2-fid, spirally coiled above and below fork. *Leaves* simple, petiolate, alternate, acuminate, dentate, palmately lobed, villous on both surfaces, 6–18 × 6–19 cm; petiole pubescent, cylindrical, 5–6 cm long. *Inflorescence* axillary. *Fruit* pepos, round, pubescent, green and chalky, with white lines appearing vertically on fruit from stalk to tip, stalk 1.5 cm long, bearing terminal leaf. *Seed* lanceolate, milky, 0.1–0.3 × 0.1 cm.

Location in Akwa Ibom:—Obot Akara and Mkpat Enin.

Abundance:—It was present in 13% of sampling plots and was rare.

10. *Telfairia occidentalis* Hooker (1871: 524) (Fig. 12)

Local Name:—Nkong Ubong (Annang), Ikong (Ibibio).

Common Name:—Fluted pumpkin.

Habitat:—Cultivated farmland.

Description:—Herb, perennial, trailing and climbing by means of tendrils. *Stem* herbaceous, angular glabrous, 0.9–2.0 cm diam.; tendrils 2-fid, spirally coiled above fork. *Leaves* compound with 3–5 leaflets palmately arranged on leaf stalk, petiolate; leaflets shortly stalked, elliptic or ovate, serrate, young leaflets glabrous, scabrid when older, 6–29 × 4–12 cm, deep green; petiole hollow, herbaceous, 4–8 cm long, 0.2–0.7 cm diam., glabrous. *Inflorescence* a raceme, 12–15 cm long, bracteate. *Flowers* pedicellate, pedicel 0.1–0.2 cm long; calyx crenate; corolla lobe ovate, 1–3 cm long, individual petals creamy white with reddish purple eye inside. *Fruit* pepos, pale green, ± 50–100 × 20–30 cm, with many seeds (30–150) embedded in yellowish pulp. *Seed* flat, 1.5–2.0 × 3–4 × 2.5–3.0 cm, black.

Location in Akwa Ibom:—Ini, Essien Udim, Oruk Anam, Obot Akara, Ikot Ekpene, Ibiono, Uyo, Ibesikpo Asutan, Nsit Atai, Nsit Ubium, Mkpat Enin, Ikot Abasi, Oron, Mbo, and Eastern Obolo.

Abundance:—It existed in 100% of the sampling areas, and was abundant in 67% and frequent in 33% of the sampling areas.

11. *Trichosanthes cucumerina* Linnaeus (1753: 1008) (Fig. 13)

Synonyms:—*Anguina cucumerina* (L.) Kuntze (1891: 254).

Cucumis anguinus Linnaeus (1763: 1437).

Local Name:—Tomatos Uduk ikot (Annang and Ibibio).

Common Name:—Snake gourd.

Habitat:—Cultivated farmland, but also grows on fences.

Description:—Herb, climbing by means of tendrils. *Stem* herbaceous, angular, pubescent, 0.5–0.6 cm diam.; tendrils 3-fid. *Leaves* simple, alternately arranged, petiolate, dentate, acute, palmately lobed with 3 or 5 lobes, glabrous adaxially, pubescent abaxially, 5–20 × 4–15 cm; petiole cylindrical, green, 4–15 cm long. *Infloresscence* an axillary raceme, 10–15 cm long. *Flowers* pentamerous, pedicellate, with bracts, bears both stamen and pistil; sepals pubescent; corolla with free petals, white, glabrous, opens at night, coils in day with tendril-like edges; pedicel 0.5–1.0 cm long. *Fruit* green and chalky, variable in shape, mostly cylindrical, elongated like snake, 20–120 cm long, glabrous, pubescent towards stalk, with many seed borne in reddish pulp. *Seed* irregular in shape, 0.5–1.0 × 0.5 cm.

Location in Akwa Ibom:—Obot Akara, Ikot Ekpene, Uyo, and Mkpat Enin.

Abundance:—It existed in 27% of the sampling areas and was rare in these areas.

A Dichotomous Key for the Identification of Species of Cucurbitaceae in Akwa Ibom State.

1a. Petal colour white 2
1b. Petal colour yellow 5
2a. Leaf texture scabrid 3
2b. Leaf texture smooth 4
3a. Fruit shape spherical ..... ***Lagenaria sphaerica***
3b. Fruit shape not spherical ..... ***Lagenaria siceraria***
4a. Leaf type compound ..... ***Telfairia occidentalis***
4b. Leaf type simple ..... ***Trichosanthes cucumerina***
5a. Leaf apex acute 6
5b. Leaf apex acuminate 9
6a. Tendrils unbranched ..... ***Cucumis sativus***
6b. Tendrils branched 7
7a. Flowers solitary 8
7b. Flowers not solitary ..... ***Luffa aegyptiaca***
8a. Fruit smooth ..... ***Cucurbita maxima***
8b. Fruit pubescent ..... ***Siraitia africana***
9a. Leaf glabrous ..... ***Mormodica charantia***
9b. Leaf pubescent 10
10a. Fruit shape spherical ..... ***Citrullus lanatus***
10b. Fruit shape cylindrical ..... ***Citrullus mucosospermus***

Discussion

A total of eleven species in nine genera of the family Cucurbitaceae were found in Akwa Ibom State of which four species was wild and eight cultivated, with one being found as both wild and cultivated. Most samples collected during this study came from cultivated material of eight species. The bittergourd, *Momordica charantia*, is the only species that was collected as both a cultivated and a wild species. This is as a result of the recent cultivation of this plant for its robust medicinal importance, in Mbak Ekpe, a village in Ibesikpo Asutan Local Government Area (Gurbuz *et al.* 2000). The fact that *M. charantia* was frequent in all of the sampling plots in which it was found (40% of plots) could be a result of the frequent usage of this plant due to its medicinal value.

Cucurbita maxima was found as a rare plant in about half of the sampling plots (52%). It is important as a vegetable with edible leaves and fruits (Okon *et al.* 2014). Leaves contain considerable amounts of proximate and mineral nutrients, which are necessary for growth and maintenance of the body. The report by Okon *et al.* (2014) recommended that it can be used as an alternative source of food and vitamins, and should be incorporated into the daily diet routine.

Cucumis sativus was found in almost half the sampling plots (47%) and were frequent to rare. This plant is cultivated for its fruits in the area where it was collected. The fruits of this plant are common in the local markets and streets of Akwa Ibom State. Its cultivation is expanding.

Citrullus lanatus is present as a rare plant in about a quarter (27%) of the sampling plots. It grows very well in drier climates, hence the inability of the plant to grow well in the wet zones. However, the areas in which it existed were more or less upland, where the soil was drier. This plant is one of the most consumed cucurbits in the State, owing to its antibacterial and other medicinal properties, as reported by Okon *et al.* (2015). Hence the various attempts by people to cultivate it. It is, however, imported in great numbers from the northern part of Nigeria.

Citrullus mucosospermus was present in all sampling plots, where it was abundant in about half of the sampling areas, and frequent to rare in others. It was most rare in the coastal areas. This plant is a commonly grown crop for the culinary usefulness of its seeds.

Telfairia occidenntalis was present in all sampling areas and was abundant in about two-thirds, while being frequent in the remaining sampling areas. This plant is cultivated as a well-known vegetable in the State, where the leaves and seed from young fruit are eaten cooked.

Trichosanthes cucumerina was found as a rare plant in just over a quarter of the sampling areas (27%). It is not a well-known plant in the State and this is a contributing factor to its scarcity.

Lagenaria siceraria was found as a rare plant in almost half of the sampling areas (47%). Only 2 varieties of *L. siceraria* were identified in the course of this study. This is not in agreement with the reports of Ibiok *et al.* (1991), who reported five varieties of *L. siceraria* that were locally known as Ikibo, Ata ikim, Iko ukot, ikpok, and Obo ukebe in Akwa Ibom State. Ibiok *et al.* (1991) also reported that the dried fruit shell of these varieties are useful as traditional

containers, wine cups, enema bottles, and frying pans for stiring Garri while frying. However, the rare occurrence of *L. siceraria* could be a result of the non-frequent usage of the cup-like fruit, due to the invention of modern disposable cups and other plastics that many find more convenient to use than the cup from the plant. This agrees with the report of Ibiok *et al.* (1991). The decline in quantity of *Raphia* palm, which is the source of palm wine that the cup is used for, is also a contributing factor to the loss of interest in the plant by people who previously cultivated it.

The weedy species, *Lagenaria sphaerica* and *Luffa aegyptiaca* were both present in all sampling areas where they were abundant in about three-qaurters of the sampling areas, frequent in most of the remaining areas, and rare in a few. *Lagenaria sphaerica* is a very common weed along streets across the State, while *L. aegyptiaca* is a common weed that grows in fallow bushes and uncompleted buildings across the State.

Siraitia africana has been described from East Africa (Tanzania) and previously only collected once in Nigeria by Onochie (No. 40214, Forest Herbarium Ibadan) in Gwari District, Bonu, June 21, 1958 (as *Thladiantha africana*) (Jeffrey 1962). It was thought to be very rare or even extinct. During this study it was found to be rare in only two of the sampling areas. This species is reported to have been very good mulch material for the local farmers, especially those cultivating yam and other tuber crops before they became rare and was no longer found commonly. It grows in fallow bush.

Conclusion

This study concludes that 11 species of Cucurbitaceae were found in Akwa Ibom State. Of the 11 species recorded in this work, 3 are wild, 7 are cultivated species, and one occurs in both wild and cultivated state. Useful species like *Cucurbita maxima*, *Lagenaria siceraria,* and *Trichosanthes cucumerina* are in decline due to the lack of popular use and they need to be conserved. However, *Siriatia africana* that was collected in the course of this work, is not mentioned in the Flora of West Tropical Africa. It was last collected in North Central Nigeria in 1958 and never reported for South Eastern Nigeria. This supports the fact that many plant species are yet to be discovered, hence the need for more floristic inventory of the different plant families across Africa, especially in Akwa Ibom State, Nigeria.

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Appendix 1: List of voucher specimens of Cucurbitaceae collected in Akwa Ibom State, Nigeria

	Species	Herbarium number
1	*Citrullus lanatus*	No herbarium vouchers for *Citrullus lanatus* were collected due to refusal of the farmers to allow collection of samples, especially since plants were fruiting and it would interfere with the yield.
2	Citrullus mucosospermus	1. Umoh,UUH3889(Abama) 2. Umoh,UUH3890(Ikot Otu) 3. Umoh,UUH3891(Abama) 4. Umoh,UUH3892(Uyo) 5. Umoh,UUH3893(Uyo) 6. Umoh,UUH3894(Abama) 7. Umoh,UUH3895(Ikot Otu) 8. Umoh,UUH3896(Uyo)
3	*Cucumis sativus*	1. Umoh,UUH3846(Abama) 2. Umoh,UUH3847(Ikot Otu) 3. Umoh,UUH3848(Ukana) 4. Umoh,UUH3849(Abama) 5. Umoh,UUH3850(Abama)
4	*Cucurbita maxima*	1. Umoh,UUH3851(Abama) 2. Umoh,UUH3852(Ikot Otu) 3. Umoh,UUH3853(Ibiono)
5	*Lagenaria siceraria*	1. Umoh,UUH3886(Ibesikpo) 2. Umoh,UUH3887(Abama) 3. Umoh,UUH3888(Iko)
6	*Lagenaria sphaerica*	1. Umoh,UUH4035(Abama) 2. Umoh,UUH4036(Uyo) 3. Umoh,UUH4037(Abama) 4. Umoh,UUH4038(Oruk Anam) 5. Umoh,UUH4039(Nto Ndang) 6. Umoh,UUH4040(Ekparakwa) 7. Umoh,UUH4041(Iko town) 8. Umoh,UUH4042(Oron) 9. Umoh,UUH4043(Oron) 10. Umoh,UUH4044(Ikot Ekpene) 11. Umoh,UUH4045(Ebuhu) 12. Umoh,UUH4046(Odot) 13. Umoh,UUH4047(Ikpe Mbak Eyop) 14. Umoh,UUH4048(Ittreto) 15. Umoh,UUH4049(Ikot Etetuk) 16. Umoh,UUH4050(Ibaka) 17. Umoh,UUH4051(Esin Ufot) 18. Umoh,UUH4052(Ikot Edibon)

7	*Luffa aegyptiaca*	1. Umoh,UUH3854(Uyo) 2. Umoh,UUH3855(Okorotte) 3. Umoh,UUH3856(Atabrikang) 4. Umoh,UUH3857(Ikot Akan) 5. Umoh,UUH3858(Uniuyo) 6. Umoh,UUH3859(Uyo) 7. Umoh,UUH3860(Uyo) 8. Umoh,UUH3861(Mbo) 9. Umoh,UUH3862(Mbo) 10. Umoh,UUH3863(Ete) 11. Umoh,UUH3864(Ibesikpo) 12. Umoh,UUH3865(Ikot Otu) 13. Umoh,UUH3866(Nsit Ubium) 14. Umoh,UUH3867(Mkpat Enin) 15. Umoh,UUH3868(Ibiono) 16. Umoh,UUH3869(Nto Nsek) 17. Umoh,UUH3870(Oruk Anam) 18. Umoh,UUH3871(Ini) 19. Umoh,UUH3872(Uyo) 20. Umoh,UUH3873(Ikot Ekpene) 21. Umoh,UUH3874(Ikpe Mbak Eyop) 22. Umoh,UUH3875(Abama) 23. Umoh,UUH3876(Nto Ndang)
8	*Mormodica charantia*	1. Umoh,UUH3832(Abama) 2. Umoh,UUH3833(Uyo) 3. Umoh,UUH3834(Uyo) 4. Umoh,UUH3835(Abama) 5. Umoh,UUH3836(Abama) 6. Umoh,UUH3837(Abama) 7. Umoh,UUH3838(Ete) 8. Umoh,UUH3839(Ibesikpo) 9. Umoh,UUH3840(Obot Akara) 10. Umoh,UUH3841(Abama) 11. Umoh,UUH3842(Uyo) 12. Umoh,UUH3843(Ete) 13. Umoh,UUH3844(Abama) 14. Umoh,UUH3845(Abama)
9	*Siraitia africana*	1. Umoh,UUH3883(Abama) 2. Umoh,UUH3884(Ikot Oyoro) 3. Umoh,UUH3885(Abama)
10	*Telfairia occidentalis*	1. Umoh,UUH3897(Abama) 2. Umoh,UUH3898(Uyo) 3. Umoh,UUH3899(Ikot Otu)
11	*Trichosanthes cucumerina*	1. Umoh,UUH3877(Abama) 2. Umoh,UUH3878(Uniuyo) 3. Umoh,UUH3879(Mkpat Enin) 4. Umoh,UUH3880(Ikot Otu) 5. Umoh,UUH3881(Abama) 6. Umoh,UUH3882(Abama)