

Descriptive and Vegetative Characterization of fifteen ecotypes of Snake Gourd (*Trichosanthes cucumerina* L.) in Nigeria

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Abstract. The descriptive and vegetative characterization of fifteen ecotypes of *Trichosanthes cucumerina* L (snake gourd) in Nigeria was carried out. The field study was done in two locations Markurdi and Umudike to evaluate the descriptive and vegetative characters of fifteen ecotypes of *T. cucumerina* from Middle Belt of the country, the South-South, South Eastern part and South Western part of Nigeria. Randomized Completed Block Design was adopted for the experiment at the exploration farm of Michael Okpara University of Agriculture, Umudike and Federal University of Agriculture, Makurdi at the same growing season. Descriptive and vegetative analysis was done using Minitab 16. The qualitative vegetative characteristic of snake gourd accessions vigour levels ranged from low, moderate and high. Leaf colour was from deep/pale/light green, stem colour was light, pale and deep green. The mean of the vegetative characters ranged from 2.7660-1575 ±0.48-99; cumulative variation percentage 7.65-64.75;. The germination percentage of all the accessions was significant ($p < 0.05$). CRS – IKM (100+00), Osu – OSH – 2 (91.67±4.82).EKT – OYE was higher than Ben-MKDI (58.36±8.34). The plant height among the accessions was not significant, block was significant ($P \leq 0.05$). Leaf sizes (cm) of all the accessions were not significant ($P > 0.05$), while main vine length (cm) at 5% probability was not significant and their treatment interaction was insignificant ($P > 0.05$). The main vein length was highest in ABI-UKW with 636.0±164.0, followed by EKI-OYE 514.0±84.3 and least from RIV-ELE 275.7±26.4. The fruit colour at ninety days (90) of ten (10) accessions of snake guard was orange green or strip orange green and remaining accessions was milky green or light green. The fruit shape was long, thick and cylindrical. The seed colour was speckled russet.

Keywords: descriptive characters, fifteen ecotypes, *Trichosanthes cucumrina*, vegetative

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1. Introduction

In the recent times Neglected and underutilized species (NUS) have gained attention owing to its potentials in reducing and controlling risk of agricultural production systems plus their nutritional potentials. According to Toensmeier *et al.*, 2020 [1], *Trichosanthes cucumerina* have been neglected by agriculture having stopped the cultivation and hardly found within home gardens, so it is sliding towards extinction as a plant mainly consumed by sub-urban inhabitants mainly in West Africa [2]. According to Ekeke and Agogbua [3], *T. cucumerina* L. is a member of the family Trichosanthes thus is one of the important family of cucurbitaceae. The cucurbits family is as one of the economically groups, including the most species providing human with edible products and beneficial fibers [4]. Plants of this group have high genetic diversity for fruit shape and other fruit characteristics as a result of their above ground development [5]. Economic important cultivated crops can be found in some genes of Cucurbitaceae family, such as Cucurbits, Citrillus, Lagenaria, Momordica, and Trichosanthes [6], [7].

T. cucumerina ordinarily referred to as snake gourd, viper gourd, long tomato and sometimes snake tomato [8]. The center of diversity of this genus is Southeastern Asia mainly India eastward to Taiwan, South eastward to Australia, Japan and the Philippines, Fiji and also Pacific Islands [9]. Trichosanthes L. has the largest genus of the cucurbitaceae with 918 species [10], [11]. Two cultivated species *Trichosanthes* are *Trichosanthes anguina* L. and *T. dioica* Roxb and numerous forest base species [12]. Long tomato (*T. cucumerina*) is grown in Southeast Asian nations for the unripe fruit that can be prepared and served as vegetable [13]. According to Aderibigbe [14] the matured fruit of viper gourd is used as a result of the sweet testing, aromatic and deep red endocarp pulp in Nigeria.

In the reports of Pulok [15], *T. cucumerina* is naturally antibiotic cough medicine, laxative, cure lumpy and hard stooling and according to [15] has demonstrated excellently against diabetes. Long tomato (*T. cucumerina*) is used in dealing with wounds, swellings, sores, skin eruptions, like eczema and dermatitis [16]. Thus, the call to investigate the descriptive and vegetative characterization of the fifteen ecotypes of Long tomato in Nigeria in order to understand the impact of difference in locations on the germinative and the vegetative characters of the snake gourd.

2. Materials and Methods

Seeds of snake gourd (*Trichosanthes cucumerina*) capable of germinating under suitable conditions ecotypes were sourced and collected from the following locations (Table 1). The descriptor used was the International Plant Genetic Resources Institute (IPGRI) (IPGRI, 2003) for Melon (*Cucumis melo*). The agronomical-morphological evaluated were: vigour level, leaf colour, stem colour, tendril habit, number of germinations, germination percentage, number of

nodes, plant height (cm), number of branches, stem diameter (cm), primary branch length (cm), leaf size (cm), duration of vegetative, main vine length, plant biomass. The studies were two locations work in the rainforest zone of Umudike and derived savannah of Makurdi in Nigeria in 2021.

Table 1. Source Location

S/N	Label	Source Location	Ecotype
1	V1	Oshogbo Osun State 1	Rainforest
2	V2	Iwo, Osun State 2	Rainforest
3	V3	Makurdi, Benue State 1	Derived savannah
4	V4	Adikpo, Benue State 2	Derived savannah
5	V5	NHST – 0588	Rainforest
6	V6	Ikwuano, Abia State 1	Rainforest
7	V7	Ukwa, Abia State 2	Rainforest
8	V8	NAGRAB – 00753	Rainforest
9	V9	Ikom, Cross River State	Rainforest
10	V10	Rumibekwe	Rainforest
11	V11	Oye-Ekiti, Ekiti State	Rainforest
12	V12	Nasarawa State	Derived savannah
13	V13	Elelenwo – Rivers State	Rainforest
14	V14	Benin, Edo State	Rainforest
15	V15	Ilorin, Kwara State	Guinea savannah
	15	TOTAL	

Randomized Completed Block Design was adopted for the experiment at the exploration farm of two universities; Federal University of Agriculture Makurdi Benue State and Michael Okpara University of Agriculture Umudike Umuahia Abia State. The measureable characters were tallied, this was done with metric rulers and weighed with the aid of a weighing balance. The descriptive and vegetative characters were analysed using Minitab 16. In the crop management the planting space of 0.5m x 1.0m intra and inter-row with 1m alley between replicates were used. The plants were stacked and manual weeding done as required. There were no serious pathogens reported that can damaged the crop. The data collected was analysed for each planting site(s).

3. Results

The qualitative vegetative characteristic of snake gourd accessions vigour levels ranges from low – high, leaf colour was from deep/pale/light green, stem colour was light, pale and deep green. *Trichosanthes cucumerina* tendrils habit for all the accession was forked spiral.

The quantitative vegetative characters of snake gourd accession of number of germination means were 18.88 ± 0.5 . The percentage germination (%) of all the accessions means was

75.78±2. The plant height (cm) means of all the accessions was 136.04 ± 4 while their maximum 233.0 and 87.0 respectively. The number of branches mean of all the accessions was 6.833 ±5 maximum 14.0 and minimum 1.0 respectively.

Table 2. Description of Qualitative Vegetative Characters of Snake Gourd Accessions

Accession code	Location	Vigour level	Leaf colour	Stem colour	Tendrill habit
ABI-UKW	Abia	high/low	deep/pale/light green	light green/pale green	forked spiral
KWA-ILO	Kwara	high/moderate	deep/pale green	pale green	forked spiral
OSU-OSH-1	Osun	high/moderate	deep/pale/light green	light green/pale green	forked spiral
BEN-MKD1	Benue	moderate/low	deep/light green	light/deep green	forked spiral
RIV-RUM	Rivers	high/moderate	deep/pale/light green	light/pale/deep green	forked spiral
NHST 0588	Seed Centre	high	deep/pale/light green	light/pale/deep green	forked spiral
ABI-IBE	Abia	low	deep/pale/light green	light/pale/deep green	forked spiral
EKI-OYE	Ekiti	high	stripped/light/pale green	light/pale/deep green	forked spiral
BEN-MKD2	Benue	high/low	stripped/light green	light/deep green	forked spiral
RIV-ELE	Rivers	moderate/low	stripped/light green	light/deep green	forked spiral
OSU-OSH-2	Osun	high/moderate	milky/pale green	pale/deep green	forked spiral
ABI-IKW	Abia	high/moderate/low	pale/light green	light/pale green	forked spiral
NGB00753	Seed Centre	moderate	pale green	pale green	forked spiral
EDO-BEN	Edo	high/moderate/low	deep/stripped/light green	pale green	forked spiral
NAS-KDK	Nasarawa	moderate	milky/pale green	pale green	forked spiral
CRS-IKM	Cross River	high/moderate	pale/light green	pale green	forked spiral

Legend:

ABI-UKW = Abia-Ikwuano, KWA-ILO = Kwara-Ilorin, OSU-OSH-1 = Osun-Oshogbo 1, BEN-MKD1 = Benue-Makurdi 1, RIV-RUM = Rivers-Rumibekwe, ABI-IBE = Abia- Iberenta, EKI-OYE = Ekiti-OyeEkiti, BEN-MKD2 = Benue-Makurdi 2, RIV-ELE = Rivers-Elelenwo, OSU-OSH-2 = Osun-Oshogbo 2, ABI-IKW = Abia-Ikwa, EDO-BEN = Edo-Benin, NAS-KDK = Nasarawa-Kardarko, CRS-IKM = Cross Rivers-Ikom

The primary branch length (cm) of the entire accession mean was 75.78±2. The plant height (cm) mean of all the accessions was 136.04±4 while their maximum 233.0 and 87.0 respectively. The number of nodes mean was 23.60±4 while their maximum 65.0 and 5.00 respectively. The number of branches mean of all the accessions was 6.833±5 maximum 14.0 and minimum 1.0 respectively. The primary branch length (cm) of all the accessions mean was 427.7±24 while the maximum 887.0 and minimum 233.0 respectively. The leaf size (cm) mean of all the accessions was 15.396±0.5. Duration of vegetative of all the accessions mean was 51.712±06 while their main vine length (cm) means was 427.7±14. Plant biomass (g) mean of all the accessions was 15753.99 (Table 3). The mean of the stem diameter was 2.7760±9.

Table 3. Descriptive Statistics of Quantitative Vegetative Characters of Snake Gourd Accessions

Characters	Mean.	S.E	CV (%)	Minimum	Maximum
No of germination	18.188	0.486	18.52	10.0	24.0
Percentage germination (%)	75.78	2.03	18.52	41.67	100.0
Plant height (cm)	136.04	4.21	21.44	87.0	233.0
No of nodes	23.60	4.21	64.75	5.00	65.0
Stem diameter (cm)	2.7760	0.098	24.42	1.20	5.00
No of branches	6.833	0.417	42.30	1.00	14.0
Primary branch length (cm)	427.7	24.0	38.93	233.0	887.0
Leaf size (cm)	15.396	0.48	21.61	10.00	25.0
Duration of vegetative	51.792	0.572	7.65	45.00	66.0
Main vine length (cm)	427.7	24.0	38.93	233.0	887.0
Plant biomass (g)	1575.3	99.0	43.56	572.0	4100.0

Legend: S.E = Standard error; CV = Coefficient of variation

The germination percentage of all the accessions was significant ($p < 0.05$). CRS – IKM (100+00), Osu – OSH – 2 (91.67±4.82) and EKT – OYE was higher than Ben-MKD1 (58.36±8.34). The plant height among the accessions was not significant block was significant ($P < 0.05$). Leaf sizes (cm) of all the accessions was not significant at ($P < 0.05$) while main vine length (cm) was not significant at ($P < 0.05$) and their interaction was not significant at ($P < 0.05$). Table 4.

Table 4. Vegetative Character State of Snake Gourd Accessions

Accession code	Percentage germination (%)	Plant height (cm)	Leaf sizes (cm)	Main vine length (cm)
ABI-UKW	72.23±2.77	126.67±7.51	16.33±0.33	636.0±164.0
KWA-ILO	72.23±2.77	118.33±6.36	18.33±2.40	419.3±51.3
OSU-OSH-1	91.67±4.82	111.3±18.2	16.33±1.45	539.0±20.1
BEN-MKD1	58.36±8.34	171.3±31.1	14.67±2.67	483.0±85.6
RIV-RUM	69.47±5.02	165.0±17.6	13.50±1.32	508.0±194.0
NHST 0588	72.20±6.05	133.67±9.94	16.00±1.53	376.3±58.3
ABI-IBE	72.23±2.77	123.0±13.7	16.67±2.19	332.3±63.1
EKI-OYE	100.0±0.00	119.67±8.95	18.33±3.33	514.0±84.3
BEN-MKD2	66.7±0.00	162.0±12.6	14.67±2.60	472.3±44.9
RIV-ELE	68.04±5.02	153.0±16.2	13.67±1.86	275.7±26.4
OSU-OSH-2	91.67±4.82	118.0±15.1	14.17±2.09	388.3±28.7
ABI-IKW	76.37±3.67	125.33±8.67	16.167±0.44	482.0± 195.0
NGB00753	74.99±4.80	145.3±12.4	12.67±0.67	300.0±14.0
EDO-BEN	62.49±2.42	129.0±21.1	12.67±1.20	338.3±79.8
NAS-KDK	63.91±2.79	152.7±18.3	15.00±2.89	394.7±77.2
CRS-IKM	100.0±0.00	122.3±13.0	17.17±1.48	383.7±57.5
F (accession)	F=11.53, $p < 0.05$	F=1.85, $p > 0.05$	F=0.80, $p > 0.05$	F=1.11, $p > 0.05$
F (block)	F=3.86, $p < 0.05$	F=3.86, $p < 0.05$	F=0.29, $p > 0.05$	F=2.26, $p > 0.05$

Legend:

ABI-UKW = Abia-Ikwuano, KWA-ILO = Kwara-Ilorin, OSU-OSH-1 = Osun-Oshogbo 1, BEN-MKD1 = Benue-Makurdi 1, RIV-RUM = Rivers-Rumibekwe, ABI-IBE = Abia- Iberenta, EKI-OYE = Ekiti-OyeEkiti, BEN-MKD2 = Benue-Makurdi 2, RIV-ELE = Rivers-Elelenwo, OSU-OSH-2 = Osun-Oshogbo 2, ABI-IKW = Abia-Ikwa, EDO-BEN = Edo-Benin, NAS-KDK = Nasarawa-Kardarko, CRS-IKM = Cross Rivers-Ikom

The fruit colour at ninety days (90) of ten (10) accessions of snake gourd was orange green or strip orange green and remaining accessions was milky green or light green. Most of the fruit shapewere long cylindrical and some were short, thick cylindrical. The seed colour of most of the accessions were speckled brown while the remaining was light brown (Table 5).

Table 5. Qualitative Description of Fruit/Seed in Snake Gourd Accessions

	Fruit colour @day 90	Fruit shape	Seed colour
ABI-UKW	light/orange green	Long cylindrical	light/speckled brown
KWA-ILO	light/milky green	short/long cylindrical	deep/light/speckled brown
OSU-OSH-1	milky green	long cylindrical	deep/light brown
BEN-MKD1	light/strip green	short/long cylindrical	light brown
RIV-RUM	light/orange/milky green	short/long cylindrical	speckled brown/black
NHST 0588	milky/orange green	long cylindrical	light brown
ABI-IBE	milky/light green	long cylindrical	speckled brown
EKI-OYE	strip orange green	short/thick cylindrical	speckled brown
BEN-MKD2	light/strip orange green	long cylindrical	light/speckled brown
RIV-ELE	strip orange green	long cylindrical	speckled brown
OSU-OSH-2	milky green	short/long/thick cylindrical	deep/light brown
ABI-IKW	light/orange green	long cylindrical	light/speckled brown
NGB00753	light green	short/long cylindrical	light brown
EDO-BEN	light/milky/strip orange green	short/long cylindrical	light brown
NAS-KDK	light/orange green	long cylindrical	speckled brown
CRS-IKM	milky/orange green	short/long/thick cylindrical	light brown

Legend:

ABI-UKW = Abia-Ikwuano, KWA-ILO = Kwara-Ilorin, OSU-OSH-1 = Osun-Oshogbo 1, BEN-MKD1 = Benue-Makurdi 1, RIV-RUM = Rivers-Rumibekwe, ABI-IBE = Abia- Iberenta, EKI-OYE = Ekiti-OyeEkiti, BEN-MKD2 = Benue-Makurdi 2, RIV-ELE = Rivers-Elelenwo, OSU-OSH-2 = Osun-Oshogbo 2, ABI-IKW=Abia-Ikwa, EDO-BEN = Edo-Benin, NAS-KDK = Nasarawa-Kardarko, CRS-IKM = Cross Rivers-Ikom

Merheb [17] reported the description of qualitative vegetative characters of *Trichosanthes cucumerina* (snake gourd) accessions leaf colour, stem colour, tendril habit and vigour from different locations is in agreement with [18], [19]. This is in agreement with the observation of this work. The quantitative vegetative characters of *T. cucumerina* accessions were measured in terms of yield (number of germinations, percentage germinations (%), plant height, stem diameter, leaf size and duration of vegetative, the coefficient of variation was below 35% which represent a stable characteristic. Number of nodes, number of branches, primary branch length, main vein length and plant biomass coefficient of variation was above 35% which indicates a high variation between the traits. This is in agreement with [8], [20]-[21].

Vegetative characters of *T.cucumerina* accessions which showed germination percentage of all the accession significant at (P<0.05) and block significant at (P<0.05). Plant height (cm) was not significant at within the accession at (P>0.05) but significant with the block at (P<0.05). Leaf sizes (cm) was not significant within the accession and block at (P<0.05). Main vein length was not significant both with the accession and block at ((P>0.05). This tend not agree with

Nyasulu [22] who reported that all the vegetative characters studied were significantly different among the amaranth accessions studied ($P < 0.001$). Qualitative description of fruit or seed in *Trichosanthes cucumerina* fruit colour at 90 days demonstrated orange green or milky green, fruit shape long cylindrical or thick cylindrical and seed colour was speckled brown or light brown. This agreed with the work of Jeffrey [18], whom describes the morphology of *T.cucumerina*. Description of the seed colour agreed with the report of Barcanu [8] who reported that the seed colour changes from white to grey when immature to brown when matured.

4. Conclusion

The descriptive and vegetative characterization of the accessions revealed that the germination percentage of all the accessions were significant ($P < 0.05$). Leaf of all the accession was not significant ($P < 0.05$). Main vine length of all the ecotypes was not significant ($P < 0.05$). The seed vigour ranged from low to high. The fruit length varied from long slender to thick, short cylindrical. At 90 days not all accessions fruits were indicating ripeness though *T.cucumerina* is a warm weather crop.

Disclaimer

The products used for this investigation are regularly and mostly use products in our research area in Nigeria. There is undeniably no conflict of concern between the authors and growers of the products since we do not plan to use these products as an opportunity for any litigation but for the progress of knowledge. Also, this research was not financed by the producing enterprise rather it was funded by personal efforts of the authors.

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Competing Interests

Authors have declared that no competing interests is in existence

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