

## Observations on the Floral and Vegetative Morphology of Five Variants of the Genus *Viscum* (Loranthaceae)

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**Abstract:** The observations on the floral and vegetative morphology on 5 variants of *Viscum* investigated showed some variations that could be exploited taxonomically. For example, all the 5 variants are characterized by actinomorphic type of symmetry but the inflorescence is cymose in variants A, C, E, raceme in D and solitary in B. Moreso, the inflorescence is free in B and D but fused in variants A, C, E. The seed number per fruit varies from 1-2 in variants A, B, D but from 2-3 in C, E. The fruit type is a berry in A, C, E but drupe in B and D. The vegetative morphology showed that both variants are erect shrubs that are dichotomously branched. The leaf texture is leathery and rough in A but leathery and smooth in others. The leaf shape is obovate in A, ovate in C and E, elliptic in B and lanceolate in D. The differences in floral and vegetative morphology are not enough for absolute delimitation of these variants rather variants A,C,E are more closely related. The similarities in structures showed intervariant relationships and reasons for all to be in the same genus.

**Key words:** Observations, floral, vegetative, morphology, *Viscum*, variants

### INTRODUCTION

The genus *Viscum* belongs to the family Loranthaceae. The African Mistletoes are parasitic plants that derive all or most of their nutrition from other flowering plants. They originate from the tropics where soils are typically poor in nutrition and competition between plants and microorganisms is very high. According to Takht and Zimmern (1996) the mistletoe plant belongs to various taxonomic ranks and positions. They belong to the Kingdom: Regnum, Division: Magnoliophyta, Subdivision: Magnoliophytina, Class: Rosopsida, Subclass: Rosidae, Superorder: Santalanae, Order: Santales, Family Loranthaceae and genus *Viscum*.

However, Hutchinson and Dalziel (1958) placed the genus *Viscum* into the family Viscaceae and thus excluded the genus from Loranthaceae. They recorded only seven genera in the family Loranthaceae which include *Hexixanthera*, *Barhautia*, *Euglerina*, *Globimetula*, *Agelanthus*, *Tapinanthus* and *Phragmanthera* totaling about 64 species with the genus *Tapinanthus* as the largest genus and *Tapinanthus bangwensis* as the most widely dispersed specie. Keay (1958) reported 8 genera in the West African Subregion, including the genus *Viscum*.

Nikrent and Musselman (2004) stated that at least 30 genera of mistletoes in the family of Loranthaceae occurred on introduced on cultivated trees.

However, the taxonomic identity of the genus *Viscum* has been controversial as most authorities claim that it belongs to the family Viscaceae (Engler, 1964; Nikrent and Musselman, 2004). Hutchinson and Dalziel (1958) stated that the African countryman does not necessarily differentiate one specie from another rather group name "mistletoe" tend to be used and critical distinction where necessary, is made not between species but between hosts identified as a prefix or suffix to the group name or even just by the host name.

Morphologically, *Viscum* species are perennial herbs or shrubs. They are aerial parasites on various trees. Their stems are dichotomously branched, leaves simple, opposite, thick and leathery. Perianth simple or petaloid. Stamens equal in number to perianth lobes and epiphytous. Carpels 3-4, ovary inferior with pseudocarp fruit. They remain attached to the host by means of suckers, the so called haustoria or sucking roots. Flowers are solitary or in racemes or cymes. Flowers are bisexual or unisexual, actinomorphic, brightly coloured, di or trimerous, epigynous with cup-shaped receptacle. Fruits 1-3 seeds,

full of mucilaginous sticky substances, seeds small with fleshy endosperm, embryo large with cotyledons appressed face to face.

*Viscum* species are used for decorations, they are used medicinally to treat various forms of cancer. Extracts from them have immunomodulatory effects. They are ascribed to hold magical and fetish values. Other uses include counter sorcery and problems of the unirogenital systems, skin diseases, phlebitis, fractured limbs rheumatism, cough and chest conditions.

The use of vegetative and floral morphology in the systematic grouping, characterization and classification of different taxa is no more a rare event. For example, Mbagwu and Edeoga (2006) used vegetative and floral characters to establish interspecific relationships among eight *Vigna* species found in Eastern Nigeria. Moreso, Edeoga *et al.* (1998) used vegetative and floral characters to classify eight different species of *Dioscorea*.

There is absence of clear taxonomic criteria in *Viscum* species especially in floral and vegetative morphology to delineate these species. This study therefore, present the floral and vegetative characters of 5 *Viscum* variants found in Eastern Nigeria that could be used for systematic characterization of the species under the genus.

#### MATERIALS AND METHODS

The studies were made on living plant specimens of five *Viscum* variants identified with standard herbarium specimens collected from Forest Herbarium Ibadan (FHI). The 5 variants were labeled A-E for easy identification. They were collected from 15 Local Government Areas of Imo State namely Ehime Mbano, Isiala Mbano, Aboh Mbaise, Ideato North, Ideato South, Oru West, Okigwe, Onuimo, Nwangele, Njaba, Owerri West, Nkwerre, Obowo, Oru East and Owerri North. The study was conducted at the Plant Science and Biotechnology laboratory of Imo State University Owerri, Nigeria in November 2006.

**Morphological studies:** Morphological studies were made on five fresh mature living variants of *Viscum*. The vegetative parts include the stem, where the stem habit, type, colour and bark were considered, the leaf, where the leaf texture, shape, apex, base, length and width were also studied. The floral parts include the perianths, fruits, seed number and the inflorescence were also studied. The length and width of the leaves were measured using a 30 cm rule. This was done by spreading the middle leaflet on a flat surface of a laboratory bench. Altogether, 20 measured leaves were measured for each of the variants. The seed number per fruit was obtained by counting the

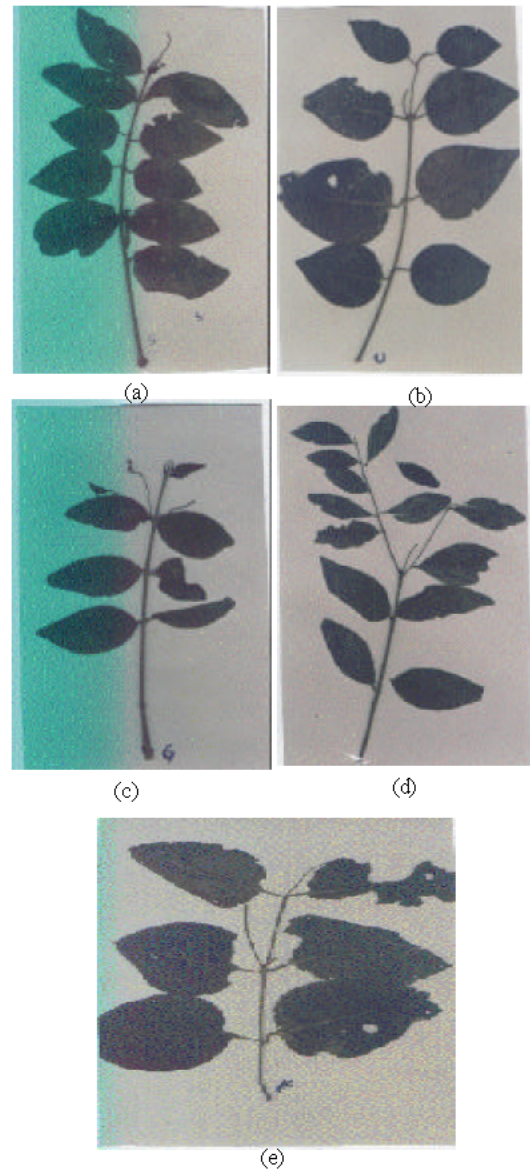


Fig 1(a-e): Habit of the five variants studied, Note the differences in the shape of leaves

number of seeds in a matured fruits so as to ensure consistency. Photographs of the variants were taken with ordinary camera ( Fig.1 a-e).

#### RESULTS

Hutchinson and Dalziel (1958), Takht and Zimmen (1996) and Keay (1958) have described the vegetative and floral morphology of African mistletoes as a whole to some extent. However, a more detailed description of the

Table 1: Floral morphology of the five *Viscum* variants studied

Characters	Variant A	Variant B	Variant C	Variant D	Variant E
Inflorescence					
Peduncle Length	10-11mm	8-9 mm	2-5 mm	5-6 mm	3-4 mm
Pedicle	Short	Short	Very short	Short	Very short
Floral symmetry	Actinomorphic	Actinomorphic	Actinomorphic	Actinomorphic	Actinomorphic
Arrangement	Nearly sessile	Nearly sessile	Nearly sessile	Nearly sessile	Nearly sessile
Type	Cymose	Solitary	Cymose	Raceme	Cymose
Perianth segment	5-6	4-5	5-6	4-5	5-6
Free/Fused	Fused	Free	Fused	Free	Fused
FRUIT					
Type	Berry	Drupe	Berry	Drupe	Berry
Shape	Ovoid	Ovoid	Ovoid	Ovoid	Ovoid
Seed number (per fruit)	1-2	1-2	2-3	1-2	2-3

Table 2: Vegetative morphology of the five *Viscum* variants studied

Characters	Variant a	Variant B	Variant C	Variant D	Variant E
Stem					
Habit	Erect shrub	Erect shrub	Erect shrub	Erect shrub	Erect shrub
Type	Dichotomously branched	Dichotomously branched	Dichotomously branched	Dichotomously branched	Dichotomously branched
Colour	Brown with white spots	Green with grayishpatches	Brown	Brown with white spots	Brown
Bark	Rough	Smooth	Smooth	Rough	Smooth
Leaf					
Texture	Leathery	Leathery and smooth	Leathery and smooth	Leathery and smooth	Leathery and smooth
Shape	Obovate	Elliptic	Ovate	Lanceolate	Ovate
Apex	Obtuse	Obtuse	Acute	Obtuse	Acute
Base	Round	Round	Round	Round	Round
Length (cm)	8.96 ±1.19	12.63± 1.45	8.23± 0.24	7.78± 1.23	15.09± 0.78
Width (cm)	6.55 ± 1.01	7.43 ± 1.59	4.07 ± 0.15	4.04 ± 1.03	10.24± 1.76

structures of the 5 variants based mainly on fresh specimens, that are of taxonomic interest is presented in this result section.

The floral morphology (Table 1) showed variations in peduncle length among the 5 variants. Variants A, B and D have short pedicle whereas variants C and E have very short pedicle. Although all the variants are characterized with actinomorphic type of symmetry and nearly sessile arrangement, the inflorescence is cymose in variants A, C and E but raceme in Variant D and solitary in variant B. Moreso, the inflorescence is free in variant B and D but fused in variant A, C and E. The seed number per fruit varies from 1-2 in variants A, B and D while it is from 2-3 in variants C and E. Although the fruit shape is ovoid in all but the fruit type is berry in variant A, C and E but drupe in variants B and D.

The vegetative morphology showed that both variants are erect shrubs that are dichotomously branched (Table 2). The stem colour is brown with white spots in A and D, brown in C and E but green with grayish patches in B. The bark is rough in variant A and D but smooth in variants B, C and E. The leaf texture is leathery and rough in A but leathery and smooth in others. The leaf shape is obovate in A, ovate in C and E, elliptic in B and lanceolate in D ( Fig 1 a-e.). The Leaf apex is obtuse in variants A, B and C but acute in variants C and E. Round leafbase characterized all the variants. The

leaf length varies from 7.78±1.28-15.09±0.78 whereas the leaf width varies from 4.04±1.03-10.24±1.76 (Table 2).

## DISCUSSION

The characteristic vegetative and floral features of the 5 variants of *Viscum* are summarized in Table 1 and 2. The outcome of this investigation showed strong intervariant relationship among the investigated variants. For example, the actinomorphic symmetry and the nearly sessile inflorescence arrangement that characterized all the variants showed a strong relationship among them.

The observation on the vegetative and floral morphology of the five *Viscum* variants showed an interesting taxonomic relationships among the investigated variants. The outcome of this research showed that variants A, C, E are closely related just as B and D. The descriptions on variant D is in line with the morphological descriptions provided by Hutchinson and Dalziel (1968, 1958) and Burkill (1995) on *Viscum congolense*. Since there are more similarities than differences in the vegetative and floral morphology, it then means that the slight variations could be due to environmental influences and the nutrient of the host plant (Nwachukwu and Mbagwu, 2006). The resemblance in structures among the variants investigated showed reasons for the 5 variants to be in the same family

Loranthaceae and genus *Viscum* while the differences in structures showed no relationship and reasons for the existence of the variants and structural polymorphism among the investigated variants. Although there is the need for further studies especially on other lines of evidence such as cytology, palynology, molecular biology etc but the data from this study however, present some important characters that could be exploited in improving the characterization of *Viscum*.

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