

Comparative Petiole Characteristics of *C. Albidum*, *C. Cainito* and *C. Subnudum* (Sapotaceae)

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INTRODUCTION

The family sapotaceae has *Chrysophyllum* as one of its genus, this family sapotaceae belongs to Order Ericales. According to Benson (1957) was of the opinion that the family is distributed widely through tropical and warm areas. The family comprises trees and shrubs with about 70 genera and 800 species with milky latex (Gill, 1988), David and Heywood (1963).

Chrysophyllum is derived from Greek, meaning "Golden leaf" from the colour of the hairs of some species. It is a tropical tree growing rapidly up to 10-20cm or more in height. *Chrysophyllum* has about 70-800 species, with seven (7) species occurring in Nigeria (Keay, 1989). The fruits of the genus *Chrysophyllum* are largely berry containing five large flattered seed.

In West Africa, 23 genera and more than 300 species are recorded. The genera includes; *Manikara*, *Mimusops*, *Kanton*, *Breviea*, *Delipdora*, *Chrysophyllum*, *Pachytela*. (Hutschson and Daniel 1963; Gill, 1988) 15 genera are recorded in Nigeria among which is *Chrysophyllum*. They are evergreen trees; the trees are usually long and straight but often low branching, deeply fluted, sometimes with small buttresses at the base. (Keay,1989).

Members of this family are often characterised by the presence of reddish hairs on the abaxial leaf surface. The leaves are simple alternate or rarely opposite, usually entire and coriaceous.

Stipulates are sometimes present but normally fall often extremely easy and are in practical terms only seen in few species.

The flowers are regular and usually bisexual and actinomorphic, only in a few species are they bisexually. They nearly always occur in clusters in the leaf-axial or on the order twigs behind the leaves or very rarely on the main trunk itself (Gill, 1988, Keay, 1989).

The latex found in *Chrysophyllum* wood is utilized as an adulterant of gutta-percha and chewing gum. The seeds of

C. albidum stung together as girdle and can be used as rattle during dancing (Okigbo, 1995).

Medicinally, a ripe fruit of *C. Cainito* because of its mucilaginous character is eaten to soak inflammation in laryngitis and pneumonia. It is given as a treatment of diabetes mellitus and as a decoction in gargled to relieve angina. A decoction of the tannia-rich, astringent bunk is drunk as a tonic and stimulant and is taken to halt diarrhoea, dysentery and as Haemorrhages in the treatment of gonorrhoea and catarrh of the bladder.

Due to close morphological resemblance of *C. albidum* and

C. subnudum, some researchers have placed *C. subnudum* as a variety of *C. albidum*, hence necessitating this study to agree or disagree with this placement. Furthermore, limited taxonomic work has been carried out on the genus *Chrysophyllum* in Nigeria despite the economic importance of the genus. Hence, the need to carry out this research work with the objectives of carrying out comparative petiole characteristics of *C. albidum*, *C. cainito* and *C. albidum* in the family sapotaceae so as to conform their inter specie relationships and form a systematic description of each of the species.

To use the result to establish if there is a relationship between these three species (*C. albidum*, *C. cainito* and *C. subnudum*).

To strengthen the reliability of the petiole characteristics in the systematic concentration of the plants.

To ascertain if the outcome of the comparative petiole characteristics will help to elucidate the problem of the morphological resemblance between *C. albidum* and *C. subnudum*.

MATERIALS AND METHODS

Specimens of the three *Chrysophyllum* species (namely *C. cainito*, *C. albidum* and *C. subnudum*) were collected from three villages in Aboh Mbaise Local Government Area of Imo State Nigeria.

SPECIMEN IDENTIFICATION

The specimens were identified by a taxonomist, Professor S.E. Okeke and were confirmed at the Forest Herbarium Institute (FH1), Ibadan Oyo State. The voucher specimens are deposited at Imo State University Herbarium (IMSUH) Owerri with numbers IMSUH 001, 002, and 003 respectively.

ANATOMICAL PREPARATION

Fresh and matured petiole were collected and sectioned. The cut sections of the petiole were done at 0.5cm from the node.

The sectioning of the petiole were obtained, the specimen underwent a pre-treatment process referred to as killing and fixing. The aim of the process was to terminate suddenly and permanently all life process within the specimens and preserve the cells composing the materials as close to their original condition as possible (Peacork, 1973).

For pre-treatment, the specimens were treated using Formalin Acetic Alcohol (FAA) for 48 hours and then washed thoroughly in distilled water. The specimen were washed in two changes of 30% ethanol and are dehydrated in a graded series of ethanol (30%, 50, 70%, 95%) for at least 15 minutes and in each, graded wax was infiltrated into the specimen. They were covered for 3 hours in each of the following solutions containing a ratio of absolute alcohol to pure chloroform (v/v: 3:1, 1:1, 1:3), then pure chloroform. Wax pellets (60^oc melting point) were added and they were changed periodically. The specimen container was transferred to an oven for 2 - 7 days to remove the chloroform. To embed in wax, the contents of the vial were carefully transferred into mould. The specimen were arranged using a flamed (hot) mounting needle and then transferred to a cold water bath where it remained until the wax is sufficiently solid and was later stored in a refrigerator for two days.

Finally, three different counts were made from different portions of each slide these given a total of ninety frequency count which were done. Data collected from the measurement and counts were properly organized and presented in table 1 and photographs illustrating the comparative petiole characteristics of *C. albidum*, *C. cainito* and *C. subnudum* were obtained in plate A, B and C using a lectz wetzler digital microscope.

RESULTS

The result showed that the shape of the petiole is semicircular in *C. albidum* and *C. cainito* but round in *C. subnudum* (Plates A, B, C). Cuticle structure and bundle sheath are present in the three taxa studied.

Epidermal cells are uniseriate in all the taxa investigated. Also the vascular bundle arrangements form an arc with invagination that curves inwards at the ends in the three taxa (Plates A, B, and C) Trichomes are absent, *C. cainito* and *C. subnudum* have well developed vascular bundles about 6-7 arranged to form an arc with distinct xylem and phloem cells. While in *C. albidum* they are 3-7 arranged to form an arc within the cortex (Table 1). The shape of the epidermal cells is rectangular in *C. albidum* and *C. cainito* while it varies from rectangular to pentagonal in *C. subnudum*.

TABLE 1: COMPARATIVE PETIOLE CHARACTERISTICS OF *C. ALBIDUM*, *C. CAINITO* AND *C. SUBNUDUM*

Characteristics	<i>C. albidum</i>	<i>C. cainito</i>	<i>C. sumnudum</i>
Petiole	Semi-circular	Semi-circular	Round
Cuticle structure	Present	Present	Present
Epidermal cells	Uniseriate	Uniseriate	Uniseriate
Shape of epidermal Cells	Rectangular	Rectangular	Rectangular-Pentagonal
Number of vascular Bundle	3-7	6-7	6-7
Nature of Vascular bundle	Arc with Invaginated end	Arc with Invegenated end	Arc with Invegenated end
Bundle sheath	Present	Present	Present
Trichomes	Absent	Absent	Absent



Plate A: Transverse section of the petiole of *C. albidum* showing semicircular petiole, uniseriate and rectangular epidermal cell, invaginated vascular bundle with an arc.



Plate B: Transverse section of the petiole of *C. cainito* showing semicircular petiole, uniseriate and rectangular epidermal cells and invaginated vascular bundle with an arc.

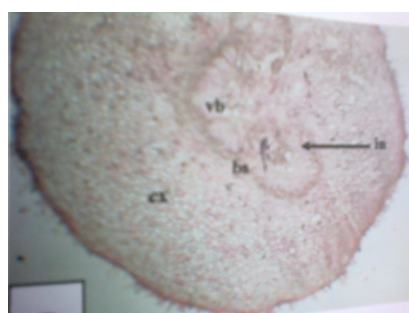


Plate C: Transverse section of the petiole of *C. subnudum* showing round petiole, uniseriate epidermal cells with rectangular to pentagonal shape and invaginated vascular bundle with an arc.

DISCUSSION

The results of the comparative petiole characteristics of *C. albidum*, *C. cainito* and *C. subnudum* were investigated and the results showed that the pattern of vascular bundle observed on the transverse section of the petiole is diagnostic. The pattern of vascular bundle in the three taxa, studied showed that it forms an arc with invaginated ends in the three taxa investigated.

This pattern could reflect the inter-specific affinity among the taxa studied. Epidermal cell of the petiole among the species were found to be uniseriate; bundle sheath was also recorded and no trichome were present in the taxa, all these strongly affirm the inter-specie relationships among the species investigated. The number of cortex in the taxa studied showed that *C. cainito* and *C. subnudum* have close affinity than *C. albidum*. Also, number of vascular bundles separated or distinguished *C. albidum* from the other two taxa studied.

Epidermal cell shapes of the three taxa showed that *C. albidum* and *C. cainito* have rectangular shaped epidermal cells while *C. subnudum* has rectangular to pentagonal. Similarities observed in the petiole anatomy are believed to be of taxonomic value indicating the inter-specie affinity among the three taxa investigated while differences could explain why the taxa stand as different species. The outcome of the result showed some characteristics that distinguished one specie from another. For example *C. albidum* and *C. cainito* with semi circular petiole shape could be distinguished from *C. subnudum* with round petiole shape. Furthermore rectangular to pentagonal epidermal cell shape of *C. subnudum* set it apart from *C. albidum* and *C. cainito* with rectangular shape. These findings are in conformity with that of Edeoga and Osawe 1996 as they observed in the genus *Senna* who used petiole characteristics to distinguish some members of the genus.

Several petiole characteristics also exist among the three investigated taxa indicating similarities for example the invaginated vascular bundle with arc at the end, the presence of bundle sheaths and the uniseriate nature of the epidermal cell are some of the petiole characteristics that could be relied upon in the systematic consideration on plant. These are in agreement with Arroyo 1985, in anatomy of Tecophilaeaceae, Cutler 1975 in Eluitharrhena and Pycnarrhenal. These similarities are not enough to place one species as a variety of the other as opined by early researchers.

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