

## Biochemical Composition Of Mistletoe As Affected By Hosts (Cocoa, Kola And Coffee Tree)

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**Abstract:** The chemical constituents and uses of several species/subspecies and varieties of the plant depend on a number of factors including the host tree. It is the secondary metabolites and pigments that are responsible for therapeutic actions in human and refined to produce drugs. The chemical profile of a plant may vary over time as it reacts to changing conditions. This is also up-regulated and down-regulated by the plants in response to the local mix of herbivores, pollinators and microorganisms. Although mistletoe has been extensively researched, work on comparison of the biochemical composition of the plant from different hosts in Nigeria is scarce. Hence this work, aimed at investigating the biochemical composition of mistletoe from cocoa, kola and coffee. The mistletoe from coffee had the highest phenol content value of 2.50g while that of kola had the lowest value of 0.90g. The alkaloid content was generally low across the mistletoes considered. The mistletoe from cocoa had the highest tannin content of 1.70g and the lowest was recorded for that of kola 0.8g. The saponin content was generally high with the mistletoe from coffee having the highest of 14.60g. The mistletoe from kola however had the highest flavonoid content of 2.03g. Some variations were also observed for the biochemical constituents of the mistletoes from the different host plants.

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### 1. Introduction

The common European mistletoe is classified scientifically as *Viscum album* L. Mistletoe is a general term for woody shoot parasites in several plant families, especially in Loranthaceae and Viscaceae families. *Viscum album*, the traditional mistletoe of literature and Christmas celebrations, is a hemiparasitic shrub, which grows on the stems of other trees. The leafless flowering dwarf mistletoes depend entirely on the host tree for nourishment. These shrubs are lethal parasites of conifers, such as pine, spruce, fir and hemlock. The plant leaves and berries contain toxic chemicals that can be poisonous and the plant should be kept out of reach of young children who may be tempted to eat the berries. As a parasitic plant, it grows on the branches of trunk of trees and actually sends out haustoria that penetrate into the tree and take up nutrients. Mistletoe is also capable of growing on its own; like other plants as it can produce its own food by photosynthesis. The phytochemical profile of mistletoe depends on the host trees of this plant. In the Southwestern Nigeria, mistletoe is commonly found growing especially on tree crops like cocoa, kola, coffee, bush mango etc. Mistletoe can also be found growing on citrus plants and guava etc. Mistletoe has been used medicinally for centuries and has been employed to treat cancer, epilepsy, infertility, menopausal symptoms, nervous tension, asthma, hypertension, headache, and dermatitis. Constituents of mistletoe with tumor-reducing components include:

lectins, viscotoxins, alkaloids, polysaccharides and polyphenolic substances. Mistletoe is used mainly in Europe as a treatment for cancer. While American mistletoe is toxic, European mistletoe is considered to have medicinal properties till today. The Drug Digests states that “for several diseases, European mistletoe has been used to treat a wide variety of physical and mental conditions. Currently, it is best known as an additional therapy with other drugs and or radiation for treating cancer”. Some HIV/AIDS Organizations (NGO's) also claim that it can help restore immune systems.

### 2. Materials and Methods

#### 2.1 Material collection

This work involved the collection of mistletoe (*Viscum album*) growing on Cocoa (*Theobroma cacao*), Kolanut (*Cola nitida*) and coffee (*coffea arabica*) along with leaves and stem bark of the respective hosts. Fresh cocoa, coffee, and kola tree mistletoes were obtained from Cocoa Research Institute of Nigeria (CRIN) Ibadan, Oyo State, Nigeria and the botanical Identification was done at the CRIN central lab. The fresh mistletoes were carefully collected from cocoa, kola and coffee tree. They were cut, air dried and ground into a uniform powdery form using a blender. This dried sample was subsequently used for the phytochemical and proximate analysis.

## 2.2 Quantitative analysis

Quantitative analysis of the different constituents was carried out using standard procedure. These include phenol, alkaloid, tannin, saponin and flavonoid. The mistletoes were examined using the Official methods of analysis of the Association of Official Analytical.

Chemists for ash content, moisture content, crude fibre, protein content and the automated soxhlet extraction method was used to determine the fat content. The carbohydrate content was calculated by using the formula:

$$100 - (\% \text{protein} + \% \text{fat} + \% \text{moisture} + \% \text{ash}) = \% \text{carbohydrate}.$$

All data were expressed as mean  $\pm$  standard deviation (SD) of three replicates for each mistletoe extract tested.

## 3. Results and Discussion

The quantitative analysis of the phytochemical screening of the mistletoe from different hosts is presented in Table 1.

**Table 1: Quantitative phytochemical analysis of mistletoe from cocoa, kola and coffee tree**

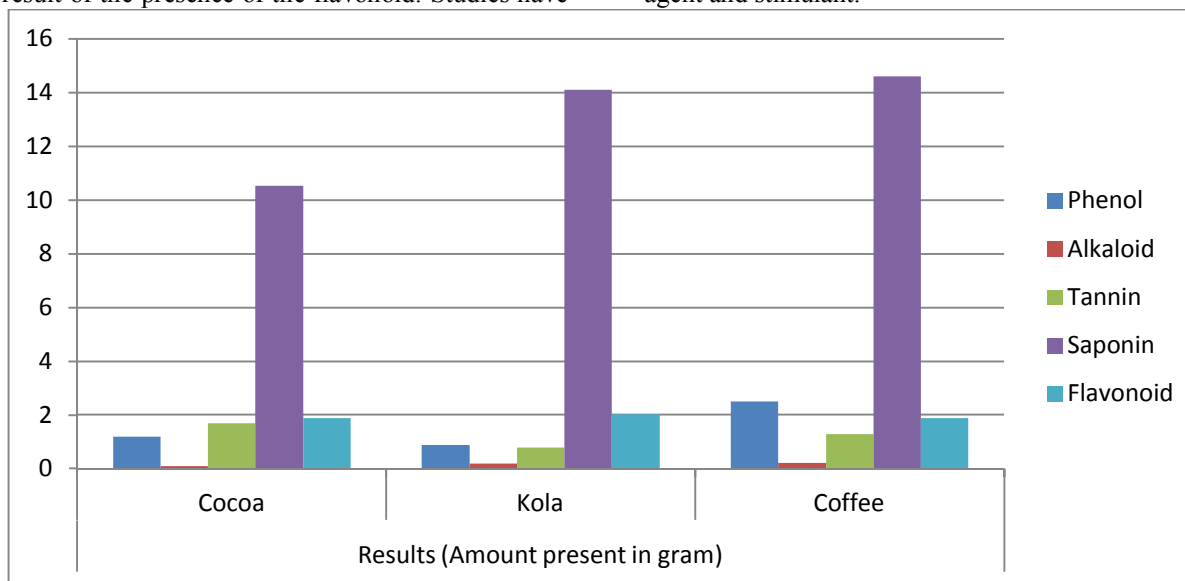
Phytochemical components	Results (Amount present in gram)		
	Cocoa	Kola	Coffee
Phenol	1.2 $\pm$ 0.01	0.90 $\pm$ 0.02	2.50 $\pm$ 0.006
Alkaloid	0.10 $\pm$ 0.006	0.2 $\pm$ 0.02	0.21 $\pm$ 0.012
Tannin	1.70 $\pm$ 0.006	0.8 $\pm$ 0.02	1.3 $\pm$ 0.00
Saponin	10.53 $\pm$ 0.008	14.10 $\pm$ 0.0058	14.60 $\pm$ 0.0058
Flavonoid	1.9 $\pm$ 0.01	2.03 $\pm$ 0.0058	1.9 $\pm$ 0.01

Note: Indicate means of triplicate values

This study has shown that phytochemicals such as tannin, flavonoid, alkaloid, phenols are present in mistletoes from cocoa, kola and coffee plant. It was also observed that the mistletoe have an antioxidant effect due to the presence of phenols with the mistletoe from coffee having the highest of 2.50g. The three mistletoes from cocoa, kola and coffee tree contains some toxic component but yet their medicinal function is essential for instance mistletoes tend to boost the body immunity. Moreover, several flavors can be obtained from these mistletoes based on the host as a result of the presence of the flavonoid. Studies have

shown that flavonoids prevent the oxidation of low density lipoproteins thereby reducing the risk for the development of atherosclerosis.

Alkaloids, though minimal in concentration, are present. This shows that the plant can be used in making preparation for effecting physiological change like pain relieving and tranquilization. This can also offer protection for the plant by discouraging animal or insect attacks. Also the presence of alkaloids may also confer some emetic properties on the plant, and hence it could also be employed locally as a purgative agent and stimulant.



**Fig 1:** Phytochemical analysis of mistletoe from cocoa, kola and coffee trees.

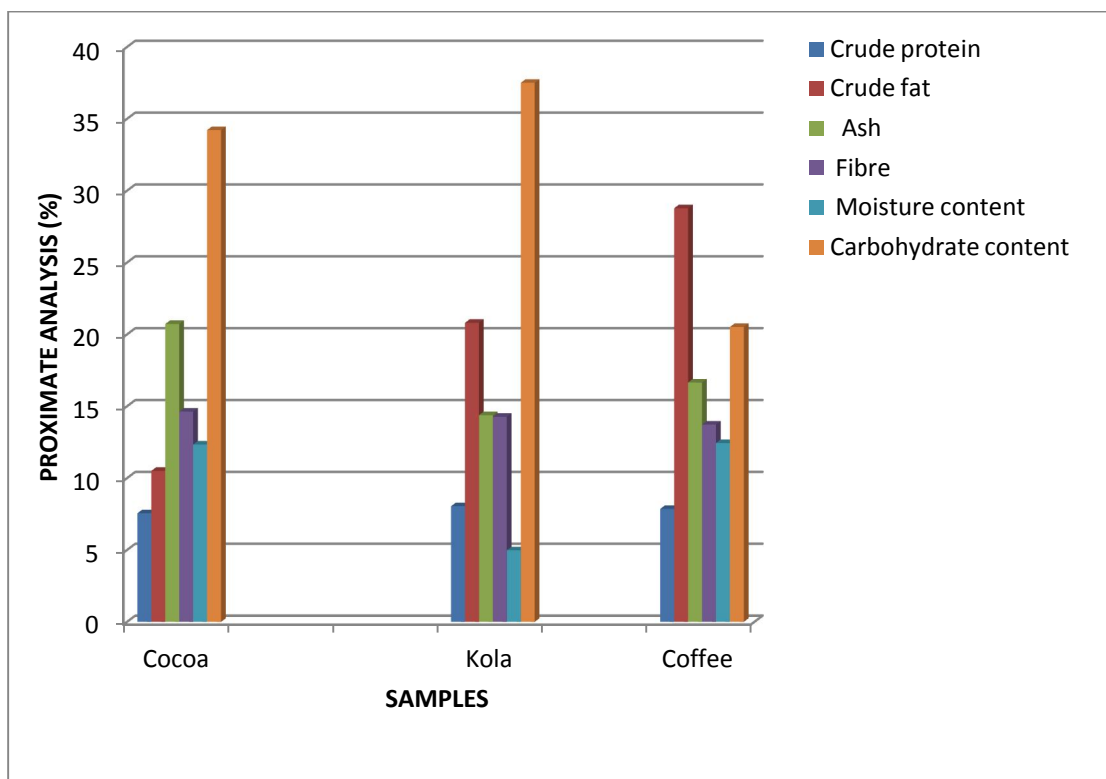
Tannin was found to present also. This is responsible for the bitter taste in the leaves. Tannins cause shrinking of soft tissue and contraction of blood vessels thus checking the flow of blood. It can also be useful in the treatment of tonsillitis, hemorrhoids, intestinal bleeding and diarrhea. Tannins may as well help against microbial degradation of dietary proteins in the rumen. The presence of tannin is also seen to be a deterrent to microorganisms which suggests that it can be used in the production of antiseptics.

Saponins have been shown to have tumor inhibitory property on experimental animals. Plant

Terpenoids are of important in pharmacy because of its wide use as anti-malaria.

Fig 1 shows the variation in the phytochemicals present in the mistletoes from the different host plants. The host plants seem to confer a difference in the phenol, tannin and saponin contents.

The proximate analysis of the powdered samples of mistletoes from cocoa, kola and coffee trees showed that the samples contain varying amounts of moisture, ash, crude protein, fat, fibre and carbohydrate. This is shown in the figure below.



**Fig 2:** Proximate composition of mistletoes from cocoa, kola and coffee trees

The influence of host plant may have a key role in the biochemical compositions of mistletoe which include tannins, flavonoids and saponin which are of physiological significance. There was a wide variation in the ash content of the mistletoes from the different hosts with that obtained from cocoa having the highest value of 20.73%. This is indicative of the presence of high amount of inorganic matter.

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