



WWJMRD 2023; 9(07): 99-101

www.wwjmr.com

International Journal

Peer Reviewed Journal

Refereed Journal

Indexed Journal

Impact Factor SJIF 2017:

5.182 2018: 5.51, (ISI) 2020-

2021: 1.361

E-ISSN: 2454-6615

**Kemboi Willy**

Department of Medical  
Microbiology, University of  
Nairobi, School of Graduate  
Studies, Kenya.

**Marianne Wanjiru Mureithi**

Department of Medical  
Microbiology, School of  
Medicine, University of  
Nairobi

**Kefa Okongo Bosire**

Department of Pharmacology  
and Pharmacognosy  
University of Nairobi

**Gracelyn Portia Anthony Doss**

Department of Biological  
Sciences and Agriculture,  
University of Eastern Africa,  
Baraton.

**Antony Otinga Otengo**

Department of Biological  
Sciences and Agriculture,  
University of Eastern Africa,  
Baraton.

**Correspondence:**

**Kemboi Willy**

Department of Medical  
Microbiology, University of  
Nairobi, School of Graduate  
Studies, Kenya.

## Medicinal Properties of *Caylusea abyssinica*: Components' Antibacterial, Antiviral and Physiological Regulations

**Kemboi Willy, Marianne Wanjiru Mureithi, Kefa Okongo Bosire,  
Gracelyn Portia Anthony Doss, Antony Otinga Oteng'o**

### Abstract

**Background:** Herbs have been used since time immemorial in different parts of the world. There are many undocumented reports from herbalists themselves that they have successfully cured diseases that modern medicine cannot cure. It is not clear how herbalists, especially in Africa, have identified certain plants as herbs or curing specific human conditions.

**Objective:** The main objective of this study was to ascertain medicinal value of one of the most valuable herbs in Kenya and Ethiopia, *Caylusea abyssinica*.

**Methodology:** Gas chromatography and mass spectroscopic technique was used to identify all phytochemicals in the root bark of the sample herb.

**Results:** Three phytochemicals were identified; methybenzoate (imine), benzeneethanamine, N-(1-methylethylidene and Benzene, (2-isothiocyanatoethy) as the major essential compounds of *C. abyssinica*.

**Discussion:** The antibiotic and physiological values of each compound were validated in the literature. The communities have identified a very valuable herb for its antibacterial, antifungal and anticancer properties.

**Conclusion:** *C. abyssinica* is very rich herbal plant that can potentially cure many chronic conditions and pathogenic infections.

**Keywords:** *Caylusea abyssinica*, medicinal value, herbs, Gas Chromatography Mass Spectroscopy.

### 1. Introduction

Phytochemicals have been identified as one of the valuable metabolites of plants. Because of its value, a scientific definition describes phytochemicals as compounds basically containing carbon. According to Smith (2016), phytochemicals are synthesized by plants to protect themselves from other possible marauders. Smith in the same vein acknowledges that plant have utilized these compounds to compete with their competitors in their ecosystem.

As humans, we can see what happens among plants and identify the benefits of some of their activities. For instance, Heneman and Zidenberg (2008) while acknowledging the significance of phytochemicals, mentioned that phytochemicals functions in the life of plants can also be translated into humans. This statement created a potential research area which till this time has not been fully exploited.

In response to Heneman and Zidenberg (2008) other scientific studies conducted previously have established criteria for the classification of phytochemicals. To date, there is a classification system which was published in 2008 by Heneman and Zidenberg that provide the basis of classification of phytochemicals.

In the wake of emerging and re-emerging infections, plant phytochemicals have gained significant attention for the reason that it has been used successfully to manage a number of infections and conditions such as (Kumari, Rajput, & Mishra, 2018) cancer and cancer related diseases for instance cell growth and proliferation rate.

This study acknowledges the fact that before introduction of modern medicine, olden medicine, utilized herbal medicine which in other words indirectly is the utilization of phytochemicals. Recently, the importance of phytochemicals list has been growing day by day. During the olden days, a number of infections and conditions were successfully managed even though herbal medicine doctors or traditional medicine could not ascertain exactly the composition of various plant extracts they were using. It would have been more perfect treatment if the exact chemical composition was known.

*Cyalusea abyssinica* is one of the valuable herbs in Rift Valley region in Kenya. This herb value has been passed from generation to generation with a strong believe that it cures various conditions ranging from helminths, bacteria, viruses and even cancer. This study pursued this claim. The plant is uprooted and its root bark is peeled chewed directly, where bark content is squeezed and swallowed directly. It was a scientific adventure to know exactly what this community has been consuming since time immemorial.

## 2. Materials and Methods

*Caylusea Abyssinica* grows mainly in fertile loose soils. The researcher identified two areas in Western Kenya where the plant grows abundantly, and also utilized guide from one of the known herbalists to identify the plant. The scientific name was confirmed by qualified botanist at the University of Eastern Africa, Baraton, department of biological sciences. The plant was uprooted, its root bark peeled and dried in the shade at the University of Eastern Africa, Baraton, Biological Sciences research laboratory.

The root bark is fleshy with strong menthol like feeling smell. It took four weeks for the plant sample to fully dry.

The dried plant was then crushed using laboratory blender, the procedure was done at Jomo Kenyatta University of Agriculture and Technology, Department of Chemistry Research Laboratory. The extraction of compounds employed two solvents, ethanol and hexane, using maceration technique and procedural shaking at 25°C for 72 hours using a shaker (Szewczyk & Bogucka, 2006). The extracted material from each solvent was filtered using cotton followed by Whatman filter paper. The filtrate was then subjected to Japan's shimadzu GCMS GP 2010 SE equipped with a BPX5 column (length 30m, thickness 0.25µm, diameter 0.25mm). The column oven temperature was set at 55°C, injection temperature at 200°C and a temperature below was used to achieve separation of compounds.

Rate	FT	Hold Time
-	55	1
10°C/min	280	13

The total program time was 37 minutes. The sample was injected in a split mode of 1:10 for each of the two solvents, that is ethanol and hexane. The mass spectrometer was run in scan mode starting from m/z of 35 – 55°C. 10n source temperature was at 200°C and interface temperature 250°C. National Institute of Standards and Technology library 2014 was used to identify the compounds based on their mass to charge ratios.

## 3. Findings

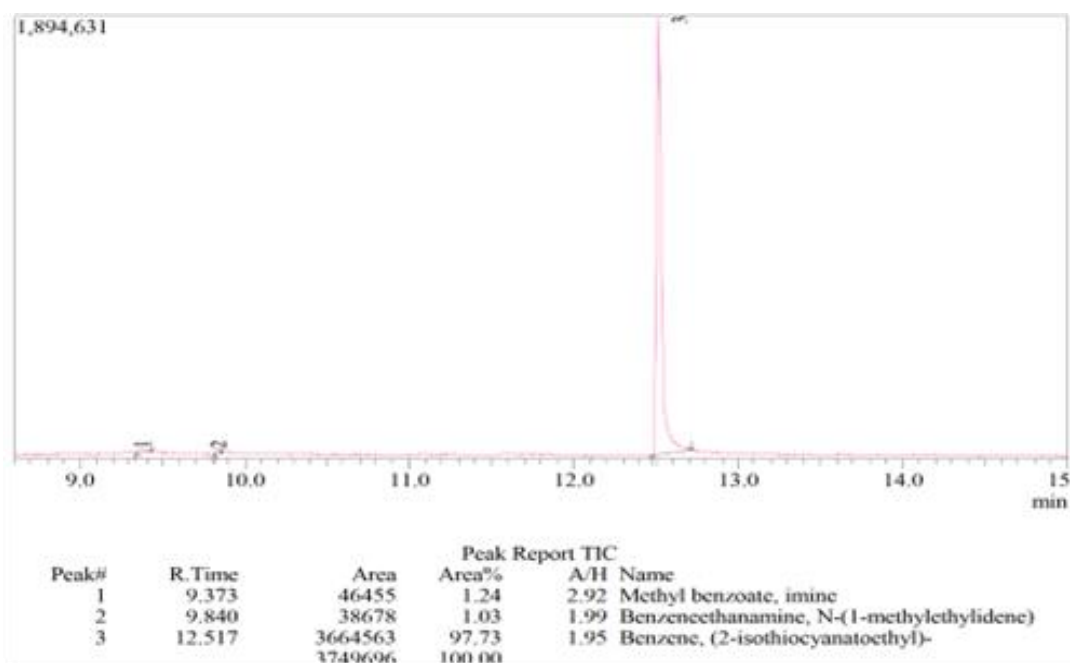


Fig. 1: Retention peaks of the identified compounds

Figure 1 shows the GC/MS output. It depicts three peaks where peak one has a retention time of 9.373 with an area of 46455, and abundance of 1.24%. The phytochemical is identified as Methyl benzoate, imine. Peak two has a retention time of 9.840 and an area of 38678 and abundance percentage of 1.03%. The phytochemical is identified as benzeneethanamine, N-(1-methylethylidene). The most abundant phytochemical identified is at peak

three with a retention time of 12.517 area of 3664563 and abundance of 97.73%. Benzene, (2-isothiocyanatoethyl) is the most abundant phytochemical. However, it should be noted that there were other small peaks depicting other compounds. Further analysis revealed more than ten other trace compounds, however, this study focused on the three peaks.

#### 4. Discussion

##### Medicinal and physiological value of *Caylusea Abyssinica*

Josephine-Ozioma and Antoinette-Nwamaka Chinwe (2019) acknowledges that over 80% of the communities in Africa still use herbal medicine. Majority of the herbal medicine used in Africa and even more specifically in Kenya mainly believed to have positive results in handling condition and the treatment of infections. With all the faith place, little scientific evidence is available to show that indeed particular phytochemicals or herbal medicine work against the purported infection.

Methyl benzoate (imine) is one of the phytochemicals identified during the study. Previous study has shown that it has significant value to human health. According to Mostafiz et al. (2022) Methyl benzoate has been shown to decrease cholinesterase activity and ascorbic acid concentrations at sublethal doses, while increasing white blood cell, red blood cell, and reticulocyte counts as well as prothrombin time at high doses.

There are several plants which its phytochemicals include benzenediamine. For instance, it has been shown that the herb of *P. bifurcatum* antioxidant and antibacterial activities may be related to benzeneethanamine (Kos, et al., 2013). Literature also revealed that the compound's antioxidant, antibacterial and anti-inflammatory activities was reported by (Krishnanunni et al., 2015). Benzenethanamine is also found in several other medicinal plants for example *Azadirachta indica*, *Ocimum sanctum* (Das, Vasudeva, & Sharma, 2014). In reference to the literature, its quite evident that *C. abyssinica* is a valuable herb to communities in Rift Valley region in Kenya.

*C. abyssinica* root bark phytochemicals are mainly anticancer and antibiotic especially antibacterial properties. Edilu, Adane and Woyessa (2015) reported two compounds namely: Beta stigmasterol and beta ergosterol as some of the compound which confer *C. abyssinica* its antibacterial properties. The major composition is Benzene, (2-isothiocyanatoethy) which is reported as anticancer compound present mainly in vegetables (Ahmed et al., 2020). Scanty information is available about this particular compound which is the most abundant.

#### 5. Conclusion

The community did not choose this herb by chance but specifically because of its medicinal value. It can be concluded from the findings and the literature that *C. abyssinica* is a valuable herb. It has antibiotic, anticancer and physiological modulator.

#### 6. Acknowledgement

University of Eastern Africa, Baraton for provision of space and materials during extraction process. Jomo Kenyatta University of Agriculture and Technology, Chemistry department, the chromatographic analysis and comparisons.

#### References

- Ahmed, A. G., Hussein, U. K., Ahmed, A. E., Kim, K. M., Mahmoud, H. M., Hammouda, O., ... & Bishayee, A. (2020). Mustard seed (*Brassica nigra*) extract exhibits antiproliferative effect against human lung cancer cells through differential regulation of apoptosis, cell cycle, migration, and invasion. *Molecules*, 25(9), 2069.
- Altaee, N., Kadhim, M. J., & Hameed, I. H. (2017). Characterization of metabolites produced by *E. coli* and analysis of its chemical compounds using GC-MS. *International Journal of Current Pharmaceutical Review and Research*, 7(6), 13-19.
- Das, S., Vasudeva, N., & Sharma, S. (2014). Chemical composition of ethanol extract of *Macrotyloma uniflorum* (Lam.) Verdc. using GC-MS spectroscopy. *Organic and medicinal chemistry letters*, 4(1), 1-4.
- Edilu, A., Adane, L., & Woyessa, D. (2015). In vitro antibacterial activities of compounds isolated from roots of *Caylusea abyssinica*. *Ann Clin Microbiol Antimicrob*, 14(15), 233-
- Heneman, K., & Zidenberg, S. (2008). Nutrition and Health Infor Sheet. ANR publication. Retrieved from <https://anrcatalog.ucanr.edu/pdf/8313.pdf>
- Josephine Ozioma, E., & Antoinette Nwamaka Chinwe, O. (2019). Herbal medicines in African traditional medicine. *Herbal Medicine*. <https://doi.org/10.5772/intechopen.80348>
- Kos, I., Jadrijević-Mladar Takač, M., Butula, I., Biruš, M., Maravić-Vlahoviček, G., & Dabelić, S. (2013). Synthesis, antibacterial and cytotoxic activity evaluation of hydroxyurea derivatives. *Acta Pharmaceutica*, 63(2), 175-191.
- Krishnanunni, K., Senthilvel, P., Ramaiah, S., & Anbarasu, A. (2015). Study of chemical composition and volatile compounds along with in-vitro assay of antioxidant activity of two medicinal rice varieties: Karungkuravai and Mappilai samba. *Journal of food science and technology*, 52, 2572-2584.
- Kumari, V., Rajput, P., & Mishra, N. (2018). Some Phytochemicals Found in Medicinal Plants Used in Cancer - A Review. *International Journal of Complementary & Alternative Medicine*, 1(6).
- Mostafiz, M. M., Hassan, E., & Lee, K. (2022). Methyl benzoate as a promising, environmentally safe insecticide: Current status and future perspectives. *Agriculture*, 12(3), 378. <https://doi.org/10.3390/agriculture12030378>
- Smith, C. (2016). *Petrochemicals*. American Fuel & Petrochemical Manufacturers. Thomson Brooks, 342.
- Szewczyk, K., & Bogucka, A. (2006). Analytical Methods for Isolation, Separation and Identification of Selected Furanocoumarins in Plant Material. *Intechopen*, 59-81. Retrieved from <http://cdn.intechopen.com/pdfs/32938.pdf>