



## Phytochemical screening and GC MS analysis of bioactive compounds from the acetone extract of *alternanthera bettzeckiana* leaves

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### Abstract

*Alternanthera bettzeckiana* also known as calico plant belongs to *Amaranthaceae* family. The present study was designed to carry out the phytochemical screening of the different extracts of the leaves of *Alternanthera bettzeckiana* and identify the bioactive compounds present in the acetone extract using GC MS analysis. A total of 11 compounds were identified from the acetone extract of leaves. The main compounds identified are Phytol, 3, 7, 11, 15-tetramethyl-2-hexadecen-1-ol, Geranyl geraniol and Vitamin E.

**Keywords:** GC MS analysis, phytol, geranyl geraniol

### Introduction

Discovery of new drugs is always very important to our health care system [1]. Though remarkable success have been achieved in the discovery and development of various drugs for the therapy of several ailments, there is still need for further discoveries. This is due to the reason that some of the drugs currently in use possess one or more of the following drawbacks (i) high toxicity level (ii) low efficacy (iii) costly or (iv) inaccessible [2]. Therefore, new drug discovery is very important. Drug discovery and development is a lengthy process which involves huge amount of money. Development of a new drug into a marketable therapeutic agent requires the effort of several years. The various sources of drugs include animals, micro-organisms, minerals, semi-synthetic/ synthetic and plant sources (herbs) [3]. Due to several adverse effects that are associated with synthesized drugs, many pharmaceutical companies are now paying more attention to the development of drugs from natural sources. However, of the natural sources of drug, more focus has been placed on developing drugs from herbs than the others. Nowadays herbs are widely used for drug discovery and development. This justifies why most drugs currently in use are from herbs. Herbs in general, are plants or plant parts used due to their flavor, scent or medicinal properties [4]. Digoxin, atropine, reserpine and colchicine are examples. Recently, attention have been shifted to drug discovery by molecular modeling [5]. The importance of herbs towards modern medicine development have been enumerated on various occasions. Apart from the direct use of plant derivatives as therapeutic agents, they can also serve as models for the design, synthesis or semi synthesis of other therapeutic agents. Therefore the scientific community invests much effort in step-up research effort on herb. Estimate has also shown that only a little percentage of herbs has been utilized for medicinal purpose. This goes to

show that there is still a lot more drugs that could be developed from herbal sources [6].

*Alternanthera bettzeckiana* is a herbaceous plant belonging to the family *Amaranthaceae*. The genus is widespread with cosmopolitan distribution [7]. A *bettzeckiana* Regel is also known as calico plant. The plant is used as an edible vegetable in Southeast Asia [8]. The present work was carried out to identify the bioactive compounds present in the acetone extract of *Alternanthera bettzeckiana*.

*Alternanthera bettzeckiana* is an erect and bushy or prostrate perennial herb with food and ornamental values. The leaves are green or reddish green and sometimes variegated. The shoots and tender leaves are used as vegetable and soups [9]. The whole plant is reported to be useful in purifying and nourishing blood. The plant also Posses laxative, antipyretic and wound healing property [10]. This genus consists of approximately 80 species and is widespread genus with cosmopolitan distribution [11].

### Synonyms

*Alternanthera versicolor*, *Alternanthera amabilis*  
*Telanthera bettzeckiana*

**Botanical name:** *Alternanthera bettzeckiana*

**Common name:** Joy weed, Calico plant

**Family:** *Amaranthaceae* [11]

### Materials and Methods

#### Collection of the plant

The plant, *Alternanthera bettzeckiana* was collected from Pala, Kottayam district, Kerala. The plant was authenticated at Botanical Survey of India, and deposited in the herbarium with voucher No. BSI/SRC/5/23/2021/Tech/258

### Chemicals and Reagents

All the chemicals and reagents were obtained from certified suppliers and of analytical reagent grade.

### Preparation of the extracts

The plant extracts were prepared by Soxhlet extraction method [12]. The dried leaves of the plant and was ground to a powder using an electrical blender. Extraction was carried out by continuous hot percolation method by using the following solvents in order i.e. Petroleum ether, Chloroform, Acetone and Methanol. The extracts were then

concentrated using a rotary evaporator and kept at 4°C until used. These extracts were used for phytochemical screening.

### Phytochemical screening

Phytochemical analysis of crude extracts of aerial parts of *Alternanthera betteckiana* was carried out as per standard procedures [13].

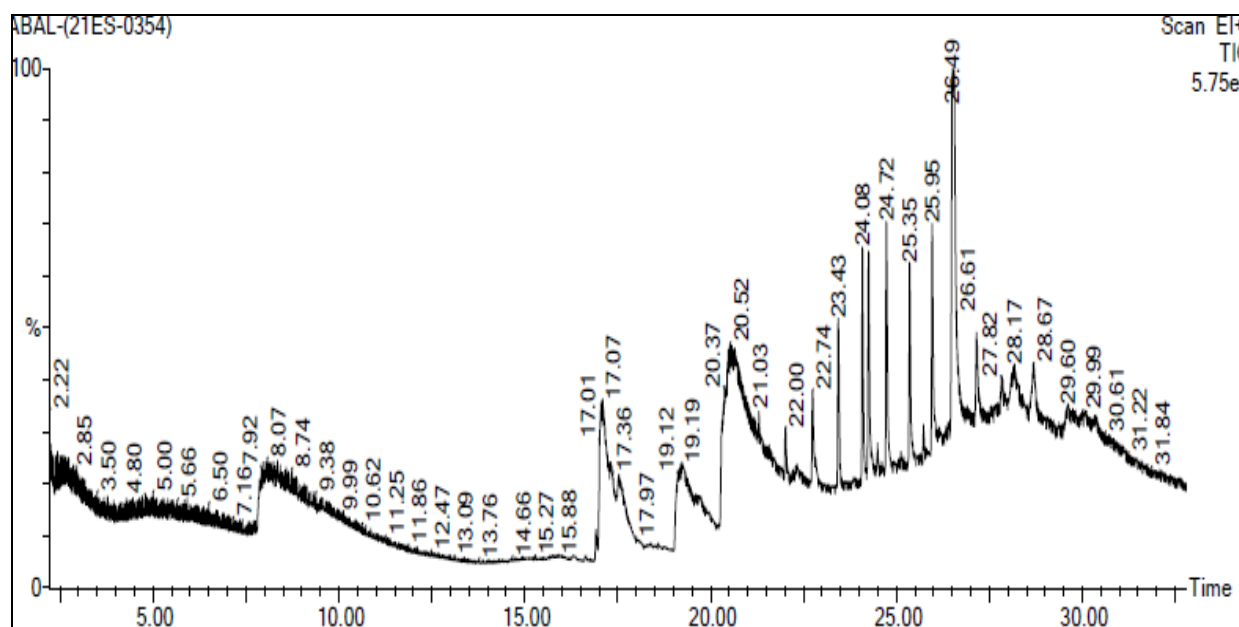
**Table 1:** Phytochemical screening of *Alternanthera betteckiana* leaf extract

SI No	Plant Constituent	PEE	CE	AE	ME
1.	Alkaloids	-	-	-	+
2.	Glycosides	-	-	-	+
3.	Steroids and triterpenoids	+	+	+	-
4.	Flavanoids	-	-	-	+
5.	Carbohydrates	+	+	-	+
6.	Phenolic compounds and tannins	+	-	+	+
7.	Proteins	-	+	+	+
8.	Saponins	-	-	-	-
9.	Fixed oils and fats	-	-	-	-

### GC MS analysis

GC-MS analysis was done on the acetone extract of aerial parts of *Alternanthera betteckiana*. Shimadzu GC – MS

(Model Number: QP2010S) instrument with GC-MS solutions software was used for analysis. The oven temperature is maintained at 280°C at a rate of 5°C/min.



Elite - 5MS column of 30m length, 0.25mmID and 0.25 micrometer thickness was used.

**Fig 1:** GC MS Chromatogram

**Table 2:** GC MS Report

Peak	Retention time	Area	Area %	Name	Mol. Formula	Mol.Wt
1	17.094	49,235,828.0	15.091	Phytol	C <sub>20</sub> H <sub>40</sub> O	296
2	17.5 3	20,595,560.0	6.313	3,7,11,15-tetramethyl-2-hexadecen-1-ol	C <sub>20</sub> H <sub>40</sub> O	296
3	19.235	32,075,024.0	9.83	N-hexadecanoic acid	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>	256
4	19.600	6,830,527.5	2.094	Pentadecanoic acid	C <sub>15</sub> H <sub>32</sub> O <sub>2</sub>	242
5	20.521	84,131,896.0	25.787	13-tetradecene-11-yn-1-ol	C <sub>14</sub> H <sub>24</sub> O	208
6	23.427	7,981,850.0	2.446	Heptacosane, 1-chloro	C <sub>27</sub> H <sub>55</sub> Cl	414
7	24.242	11,303,557.0	3.465	Geranylgeraniol	C <sub>20</sub> H <sub>34</sub> O	290
8	25.348	9,017,551.0	2.764	Hexatriacontane	C <sub>36</sub> H <sub>74</sub>	506
9	26.508	50,121,952.0	15.363	Vitamin e	C <sub>29</sub> H <sub>50</sub> O <sub>2</sub>	430
10	27.144	7,687,286.0	2.356	1-octadecane sulphonyl chloride	C <sub>18</sub> H <sub>37</sub> O <sub>2</sub> ClS	352
11	28.679	8,796,738.0	2.696	Cholesta-8, 24-dien-3-ol, 4-methyl-, (3.β.,4.α.)-	C <sub>28</sub> H <sub>46</sub> O	398

### Results and Discussions

GC MS Analysis of acetone extract of the leaves of *Alternanthera betteckiana* revealed the presence of 11

compounds. Phytol is a diterpenoid compound and it is used as a plant metabolite, a schistosomicide drug and an algal metabolite.<sup>14</sup>Pentadecanoic acid is a straight-chain saturated

fatty acid containing fifteen-carbon atoms. It has a role as a plant metabolite, a food component, a human blood serum metabolite and an algal metabolite.<sup>15</sup> Geraniol is a monoterpenic alcohol with a pleasant rose-like smell, known as an important ingredient in many essential oils, and is used as a fragrance compound in cosmetics and other products. Geraniol possess antioxidant and anti-inflammatory properties. Literatures reveal that geraniol has activity against prostate, bowel, liver, kidney and skin cancer. It can induce apoptosis and increase the expression of proapoptotic proteins<sup>[16]</sup>. Vitamin E is an antioxidant and it protects body from damage caused by free radicals. Free radicals can harm cells, tissues, and organs. Vitamin E makes the immune system strong against viruses and bacteria. It is important in the formation of red blood cells. It helps them carry out many important functions.<sup>17</sup>. Octadecane is used as a solvent, in organic synthesis, and as a calibration standard<sup>[18]</sup>.

Cholesta-8, 24-dien-3-ol, 4-methyl-, (3.β. 4 α) - A 3 beta-sterol that consists of 4 beta-methyl zymosterol in which the 4α-hydrogen is replaced by a formyl group. It is a 3 beta-sterol and a steroid aldehyde. It derives from a zymosterol<sup>[19]</sup>.

### Conclusion

GC MS Analysis of the acetone extract of *Alternanthera bettzickiana* revealed the presence of various bioactive compounds having antioxidant, anti-inflammatory and anticancer properties. Isolation of individual phytoconstituents and subjecting it to biological activity will give promising results. Therefore the plant can be considered as a source of lead compounds for the synthesis of newer drug candidates.

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