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# *In-vitro* pharmacological and Gc-Ms analysis of bioactive compounds presents in *Bytteneria herbaceae*

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**Abstract**
*Bytteneria herbaceae* is a bountifully stretched prostrate spice. Generally unique piece of this plant is utilized for the treatment of cholera, looseness of the bowels and asthma, yet need logical proof. An overabundance of water in during healing plant materials container energizes microbial development, the presence of organisms or bugs ought to affect its protection. Water-solvent extractive worth (13.1369% w/w) of entire plant has been discovered more in contrast with methanol dissolvable extractive worth (5.6528% w/w) which demonstrates the likelihood. Ethnomedicinal plants are a significant source. The screening on bioactive mixtures present in *Byttneria herbacea* entire plant separate utilizing Gas Chromatography-Mass Spectrometry (GC-MS). Significant 24 mixtures present and natural action of [R.T. 4.71] 3-buten-2-one, 4-(5, 5-dimethyl-1-Oxaspiro [2.5] oct-4-yl). [R.T. 32.61] 1H-Cyclopropa [3, 4] benz [1, 2- e] azulene-4a, 5, 7b, 9, 9a (1aH)-pentol, 3-[(acetyloxy)methyl]- 1b, 4, 5, 7a, 8, 9-hexahydro-1, 1, 6, 8- tetramethyl-, 9, 9a-diacetate, [1aR- (1aa, 1ba, 4aa, 5a, 7aa, 7ba, 8a, 9a, 9aà)]. The examination, affirms presence of tannin, saponin, flavonoids, steroids, terpenoids, triterpenoids, anthroquinone, polyphenol, glycoside and coumarins. In the GC-MS examination, 24 mixtures were distinguished and they were equipped for different pharmacological exercises like mitigating, anticancer, against joint, antiulcer and antimicrobial action.

**Keywords:** *Byttneria herbacea*, phytochemical, physicochemical**,** GC-MS

## 1. Introduction
Plants have shaped the premise of natural medication framework which has been utilized for millennia. Conventional medication alludes to wellbeing rehearses, approaches, information and convictions consolidating plant, creature and mineral based prescriptions, otherworldly treatments, manual methods and activities, applied separately or in mix to treat or to analyse and forestall sicknesses or keep up prosperity [1]. Asthma is a sickness portrayed by bronchial aviation route aggravation bringing about expanded mucous creation and aviation route hyper responsiveness. The resultant symptomology incorporates scenes of wheezing, hacking and windedness. Asthma is a multifactorial illness measure with hereditary, unfavourably susceptible, ecological, irresistible, enthusiastic and nourishing parts related with its etiology, different components like urbanization; air contamination and tobacco smoke offers all the more fundamentally [2]. Ethnomedicinal plants are a significant wellspring of phytochemicals that offer conventional therapeutic treatment of different illnesses consequently phytochemical investigation of ethnomedicinal plant making strides in the new occasions for novel medication revelation measure [3]. Protection of existing wild environment of endemic and undermined therapeutic plant species are extremely fundamental to limit or evades the deficiency of these endemic plant assets [4]. The *Byttneria herbacea* is different ancestral networks during various obsessive intercessions [5-9]. The family "Malvaceae" consist of approximately 244 genera and 4225 species [10]. It is one of the biggest families among the Angiosperms. Many plants of this family still, there are certain medicinal plants whose medicinal properties have not been explored properly [11]. Phytochemical screening is crucial for validating the traditional use of these medicinal plants. GC-MS technique was used to measure of the active principles in plants [4, 10]. GC-MS analysis technique can be used to investigate traditional medicine and to characterize the bioactive compounds.

## 2. Materials and Methods
### 2.1. Collection and preparation of sample
Fresh, healthy, and whole plant of *Byttneria herbacea* aerial part of was collected from Narthamalai Hills of Pudukkottai District, Tamil Nadu. The collected plant-parts were

washed in running tap-water to remove the adhering soil particles. They were later washed with sterile distilled water. The cleaned plant-parts were shade-dried, powdered with electric blender and preserved for further investigations. The powder sample was extracted by soxhlet apparatus with different solvents such as Ethanol and Aqueous.

### 2.3. Physicochemical analysis
Measurement of the parameters such as moisture content, foreign matter, ash value, acid insoluble ash, water-soluble extractive, alcohol soluble extractive, and pH was carried out by following standard procedures recommended by Ayurvedic Pharmacopoeia of India and other standard texts.

### 2.4. Preliminary phytochemical screening
The whole plants of *Byttneria herbacea* were assessed for the existence of the phytochemical analysis by using the standard methods [12-15].

### 2.5. GC-MS analysis
GC-MS Analysis of B. herbacea GC-MS examination of the concentrates was performed utilizing a GC-MS (Model; Thermo Trace GC Ultra Ver.5.0) outfitted with a DB-35MS combined silica fine segment (30m length X external breadth 0.25 mm X inside distance across 0.25 µm) and gas chromatograph interfaced to a Mass Selective Detector (MS-DSQ-II) with XCALIBUR programming. GC-MS location, an electron ionization framework with ionization energy of - 70eV was utilized. Helium gas was utilized as a transporter gas at a steady stream pace of 1ml/min and the example was 1µl infused; Injector temperature at 250°C; Ion source temperature at 200°C. The broiler temperature was modified from 70° to 200°C at the pace of 10°C/min, held isothermal for 1minutes lastly raised to 250°C at 10°C/min. Interface temperature was kept at 250°C. Absolute run time was 40mins. The similar level of each concentrate constituent was communicated as rate with top territory standardization. ID of mixtures translation of mass range of GC-MS was led utilizing with the mass of otherworldly data set of National Institute of Standard and Technology (NIST) having in excess of 62, 000 examples. The range of the obscure constituent was contrasted and the spectra of the realized parts put away in the NIST library.

## 3. Results and Discussion
Whole plant powder was found to be devoid of any foreign matter, which may be due to the good harvesting practice followed during the collection of the drug. Loss on drying of whole plant was 10.8568% w/w. The water-soluble extractive value (13.1369% w/w) of whole plant compare to methanol soluble extractive value (5.6528% w/w). Water-soluble and alcohol soluble extractive values are indicative of the bioavailability of the plant. pH value of water extract of whole plant was 6.5 which indicates its weak acidic nature [16].

**Table 1:** Preliminary physicochemical analysis of *Byttneria herbacea* whole plant powder

| S. No. | Physicochemical parameters | Results (%) |
|---|---|---|
| 1 | Loss on drying | 10.8568 w/w |
| 2 | Ash value | 5.6855 w/w |
| 3 | Acid insoluble ash value | 0.3368 w/w |
| 4 | Water-soluble extractive value | 13.1369 w/w |
| 5 | Methanol soluble extractive value | 5.6528 w/w |
| 6 | pH value | 6.5 |

The ash value indicates the presence of inorganic and salt materials contained by the sample. This includes both "physiological ash" which comes from the plant tissue itself, and "non-physiological" ash, which the remains of the extraneous matter (sand and soil) is adhering to the plant surface [17]. Ash value of whole plant was found to be 5.6855% w/w. Acid-insoluble ash designates the presence of more siliceous matter in the drug. Acid-insoluble ash value was 0.3368% w/w.

### 3.1. Preliminary phytochemical analysis
The presence of phytoconstituents make the plant useful for treating different diseases and have a possible of providing useful drugs to cure human diseases. The present study has found that most of the biologically active phytochemicals were present in various extract of *B. herbacea*. The present investigation showed the availability in the extract of the phytochemical in less concentration. The aqueous leaf extract of *S. acuta* have shown moderate antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa* [16]. From this study it was concluded that, *Sidaacuta* has rich phytochemical compounds. The presence of these secondary metabolites indicated they can be used to treat various diseases. The customary restorative detailing evaluated for phytochemical constituents appeared to can possibly go about as a medication which can be utilized to improve the wellbeing status of purchasers [18]. This examination will improve fundamental comprehension of the rough medication recognizable proof plan valuable in conventional consideration rehearses and could prompt opposite pharmacology by which society would get natural medications at a reasonable expense.

**Table 2:** Qualitative analysis of *Byttneria herbacea*

| S. No. | Phytochemical constituents | Ethanol | Aqueous |
|---|---|---|---|
| 1 | Tannin | + | + |
| 2 | Phlobatannins | + | + |
| 3 | Saponin | + | + |
| 4 | Flavonoids | + | + |
| 5 | Steroids | + | - |
| 6 | Terpenoids | + | + |
| 7 | Triterpenoids | | + |
| 8 | Alkaloids | - | + |
| 9 | Carbohydrate | + | - |
| 10 | Protein | + | + |
| 11 | Anthraquinone | + | + |
| 12 | Polyphenol | + | + |
| 13 | Glycoside | + | + |

***Indications:*** "+" means positive activity, "-" means negative activity

Maximum content of alkaloid was found in *n*-butanol

fraction followed by aqueous and ethyl-acetate fraction [19]. Similarly, saponin was found to be highest in aqueous fraction followed by ethyl-acetate fraction while it was negligible in *n*-butanol fraction.

### 3.2. GC-MS analysis *Byttneria herbacea*

The GC-MS Chromatogram shows the presence of 24 different peaks which confirm the presence of 24phytocompoundswith their respective RT; (Retention Time) in the extract of the whole plant of *B. herbacea.* The common mixtures in 1-1-Diethoxy-Ethane, 3-buten-2-one, 4-(5, 5-dimethyl-1-oxaspiro [2.5] oct-4-yl), Octadecanoic corrosive, (2-phenyl-1, 3-dioxolan-4-yl) methyl ester, cis-(CAS), Benzene, 1-ethyl-2, 3-dimethyl-(CAS), à-L-Galactopyranose, 6-deoxy-, cyclic 1, 2:3, 4-bis (methylboronate), 1-Hexadecanol (CAS), 11-Octadecenal (range dissents) (CAS), 2-Hexadecanol (CAS), 7-Methoxy-2, 2-dimethyl-2H-1-benzothiopyran, 1-Octadecene (CAS), Lucenin 2, 1, 3-diformyl-2-chloro-5-isopropylbenzene, 6-Octadecenoic corrosive, 1-Octadecene (CAS), Pentadecanoic corrosive, 14-methyl-, methyl ester CAS), Hexadecanoic corrosive, ethyl ester (CAS), 6-Octadecenoic corrosive, 9-Octadecenoic Acid (Z)-, Ethyl Ester, Bacteriochlorophyll-c-stearyl, Heptaethylene glycol monododecyl ether, 1HCyclopropa [ 3, 4] benz [1, 2-e]azulene-4a, 5, 7b, 9, 9a (1aH)- pentol, 3-[(acetyloxy)methyl]-1b, 4, 5, 7a, 8, 9-hexahydro-1, 1, 6, 8-tetramethyl-, 9, 9a - diacetate, [1aR 1aa, 1ba, 4aa, 5a, 7aa, 7ba, 8a, 9a, 9aa], Stigmasterol, Methyl 7-ethyl-10-hydroxy-11-hydroxy (18o)- 3, 11-dimethyl-2, 6-tridecadienoate, Stigmast-5-en-3-ol, (3a)- (CAS) [20]. GC-MS examination of adhesive showed presence of glucose, fructose, sucrose, maltose and xylose and demonstrated its degree to be of logical significance especially as plant polymer based excipient and covering material in drug items.

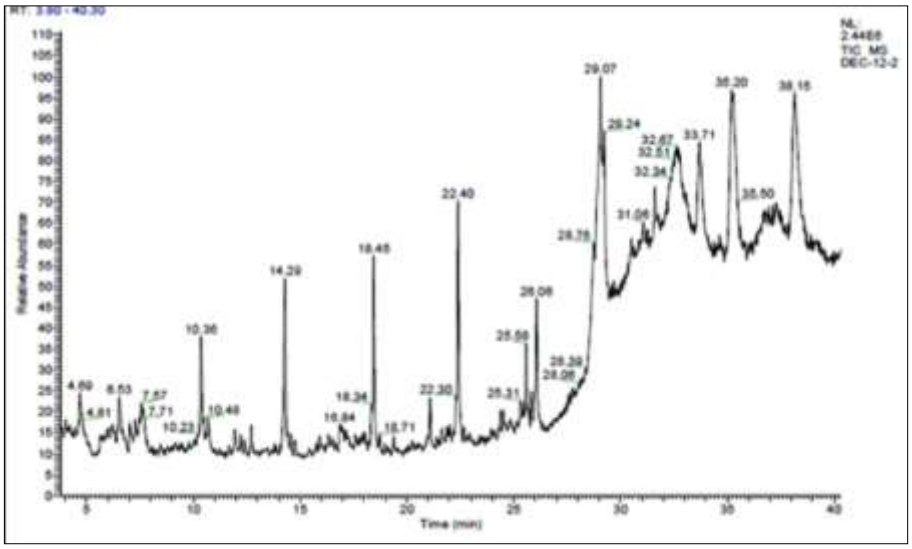


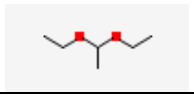
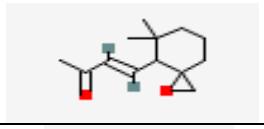
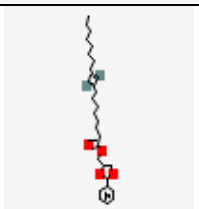
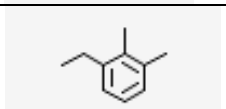
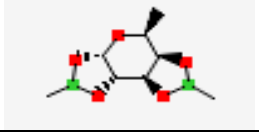
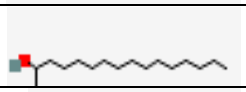
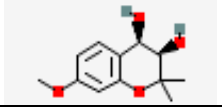
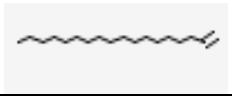
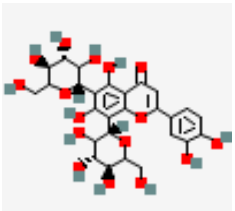
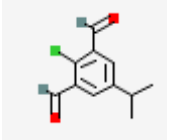

**Fig 1:** Gc-Ms chromatogram of *Byttneria herbacea*

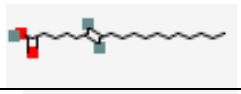
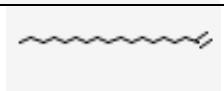
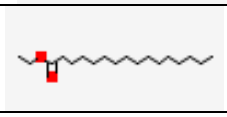
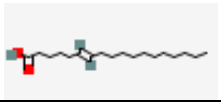
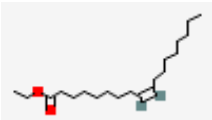
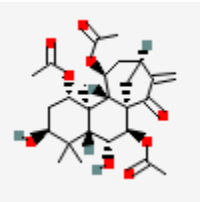
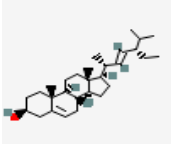
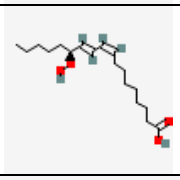
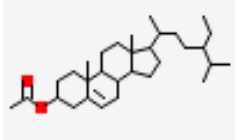
**Table 3:** GCMS analysis - bioactive compounds

| S. No. | Name of the compounds | Molecular weight g/mol | Molecular formula | Retention time | Area % |
|---|---|---|---|---|---|
| 1. | 1-1-Diethoxy-ethane | C6H14O2 | 118 | 3.04 | 4.50 |
| 2. | 3-Buten-2-one, 4- (5, 5-dimethyl-1-oxaspiro [2.5] oct-4-yl) | C13H20O2 | 208 | 4.71 | 1.61 |
| 3. | Octadecanoic acid, (2-Phenyl-1, 3-dioxolan-4-yl) methyl ester, cis-(CAS) | C28H46O4 | 446 | 6.20 | 0.99 |
| 4. | Benzene, 1-Ethyl-2, 3-dimethyl-(CAS) | C10H14 | 134 | 6.55 | 1.69 |
| 5. | à-L-Galactopyranose, 6-deoxy-, cyclic 1, 2:3, 4-bis (Methylboronate) | C8H14B2O5 | 212 | 7.61 | 2.07 |
| 6. | 1-Hexadecanol (CAS) | C16H34O | 242 | 10.36 | 3.12 |
| 7. | 11-Octadecenal (spectrum disagrees) (CAS) | C18H34O | 266 | 11.95 | 0.84 |
| 8. | 2-Hexadecanol (CAS) | C16H34O | 242 | 12.23 | 0.74 |
| 9. | 7-Methoxy-2, 2-dimethyl-2H-1-benzothiopyran | C12H14OS | 206 | 12.72 | 0.76 |
| 10. | 1-Octadecene (CAS) | C18H36 | 252 | 14.29 | 5.09 |
| 11. | Lucenin 2 | C27H30O16 | 610 | 15.92 | 0.84 |
| 12. | 1, 3-Diformyl-2-chloro-5-isopropylbenzene | C11H11ClO2 | 210 | 16.33 | 1.00 |
| 13. | 6-Octadecenoic acid | C18H34O2 | 282 | 16.90 | 0.97 |
| 14. | 1-Octadecene (CAS) | C18H36 | 252 | 18.45 | 5.37 |
| 15. | Pentadecanoic acid, 14-methyl-, methyl ester CAS) | C17H34O2 | 270 | 21.09 | 1.43 |
| 16. | Hexadecanoic acid, ethyl ester (CAS) | C18H36O2 | 284 | 22.40 | 7.04 |
| 17. | 6-Octadecenoic acid | C18H34O2 | 282 | 24.39 | 1.18 |
| 18. | 9-Octadecenoic Acid (Z)-, Ethyl Ester | C20H38O2 | 310 | 25.58 | 1.88 |
| 19. | Bacteriochlorophyll-c-stearyl | C52H72MgN4O4 | 840 | 26.06 | 3.84 |
| 20. | Heptaethylene glycol monododecyl | C26H54O8 | 494 | 29.07 | 15.55 |

| | | | | | |
|---|---|---|---|---|---|
| | ether | | | | |
| 21. | 1H-Cyclopropa [3, 4] benz [1, 2-e]azulene-4a, 5, 7b, 9, 9a (1aH)-pentol, 3-[(acetyloxy)methyl]-1b, 4, 5, 7a, 8, 9-hexahydro-1, 1, 6, 8-tetramethyl-, 9, 9a-diacetate, [1aR-(1aa, 1ba, 4aa, 5a, 7aa, 7ba, 8a, 9a, 9aà) | C26H36O9 | 492 | 32.61 | 7.28 |
| 22. | Stigmasterol | C29H48O | 412 | 35.24 | 10.88 |
| 23. | Methyl 7-ethyl-10-hydroxy-11-hydroxy (18o)-3, 11-dimethyl-2, 6-tridecadienoate | C18H32O4 | 312 | 37.30 | 1.73 |
| 24. | Stigmast-5-en-3-ol, (3á)-(CAS) | C29H50O | 414 | 38.15 | 8.05 |

**Table 4:** GCMS analysis of activities/uses of bioactive compounds of *Byttneria herbacea*

| S. No. | Name of the compounds | Structure | Activity/Uses |
|---|---|---|---|
| 1 | 1-1-Diethoxy-ethane |  | Anti-seizures [21] |
| 2 | 3-Buten-2-one, 4-(5, 5-dimethyl-1-oxaspiro [2.5] oct-4-yl) |  | Antioxidant, antihyperglycemic |
| 3 | Octadecanoic acid, (2-phenyl-1, 3-dioxolan-4-yl) methyl ester, cis-(CAS) |  | Antioxidative activity |
| 4 | Benzene, 1-ethyl-2, 3-dimethyl-(CAS) |  | Antimicrobial, anti-inflammatory [22] |
| 5 | à-L-Galactopyranose, 6-deoxy-, cyclic 1,2:3, 4-bis (Methylboronate) |  | Antimicrobial and anti-inflammatory |
| 6 | 1-Hexadecanol (CAS) |  | Anti-inflammatory, nematicide, pesticide, lubricant, antiandrogenic, flavor, haemolytic 5-alpha reductase inhibitor, antioxidant, hypocholesterolemic [23] |
| 7 | 11-Octadecenal (spectrum disagrees) (CAS) |  | Antioxidant, Hypocholesterolemic. |
| 8 | 2-Hexadecanol (CAS) |  | Antimicrobial, anti-inflammatory, anticancer, diuretic [24] |
| 9 | 7-Methoxy-2, 2-dimethyl-2H-1-benzothiopyran |  | Antioxidant, anti-inflammatory [25] |
| 10 | 1-Octadecene (CAS) |  | Potent antifungal, antimicrobial, antibacterial |
| 11 | Lucenin 2 |  | Antioxidant, antimicrobial and ant diarrheal activity [26] |
| 12 | 1, 3-Diformyl-2-chloro-5-isopropylbenzene |  | Antibacterial, antioxidant, antitumor, cancer preventive immunostimulant, Chemo-preventive, lipoxygenaseinhibitor, pesticide [27] |

| | | | |
|---|---|---|---|
| 13 | 6 Octadecenoic acid |  | Antioxidant, Hypocholesterolemic |
| 14 | 1-Octadecene (CAS) |  | Antimicrobial and ant diarrheal activity |
| 15 | Pentadecanoic acid, 14-methyl-, methyl ester CAS) |  | Antioxidant, Hypocholesterolemic |
| 16 | Hexadecanoic acid, ethyl ester (CAS) |  | Antioxidant |
| 17 | 6-Octadecenoic acid |  | Hypocholesterolemic, antibacterial |
| 18 | 9-Octadecenoic acid (Z)-, Ethyl ester |  | Ant diarrheal activity |
| 19 | Bacteriochlorophyll-c-stearyl |  | lipoxygenaseinhibitor, pesticide [27] |
| 20 | Heptaethylene glycol monododecyl ether |  | Cancer preventive immunostimulant |
| 21 | 1H-Cyclopropa [3, 4] benz [1, 2-e]azulene-4a, 5, 7b, 9, 9a (1aH)-pentol, 3-[ (acetyloxy)methyl]-1b, 4, 5, 7a, 8, 9-hexahydro-1, 1, 6, 8-tetramethyl-, 9, 9a-diacetate, [1aR- (1aa, 1ba, 4aa, 5a, 7aa, 7ba, 8a, 9a, 9aà)] |  | Antibacterial, antioxidant, |
| 22 | Stigmasterol |  | Antibacterial |
| 23 | Methyl 7-ethyl-10-hydroxy-11-hydroxy (18o)-3, 11-dimethyl-2, 6-tridecadienoate |  | Antimicrobial |
| 24 | Stigmast-5-en-3-ol, (3á)-(CAS) |  | Anti-inflammatory |

GC-MS examination uncovered the presence in phytocompounds. The greater part of them like n-Hexadicanoic corrosive, Phytol, Vitamin E, Lupeol, 2, 3 Dihydrobenzofuran, Stigmasterol, Ergost-5-en-3-ol, (3.beta., 24R), gamma-Sitosterol, Neophytadien, Naphthalene, Tocopherols, for example, alpha Tocospiro An and alpha Tocospiro B are accounted for to have restorative utility [28]. GC-MS investigation found the presence of the accompanying phyto-intensifies Methyl tetradecanoate, 9-dodeoenoic corrosive methyl ester E, Hexadecanoic corrosive methyl ester, 9, 12-octadecadienoic corrosive methyl ester, Methylstearate and Methyl 18-nonadecanoate.

## 4. Conclusion

The current examination uncovers the capability of *B. herbacea* entire plant extricate as a decent wellsprings of bioactive mixtures, for example, 17-Pentatriacontene, 9, 12, 15Octadecatrienoic Acid, Stigmasterol, Hexadecanoic corrosive, methyl ester, Stigmast 5 en 3 ol and 9-Octadecenoic Acid (Z)-, Ethyl Ester that bioactive mixtures are utilized as different diseases through conventional meds. Investigation of these bioactive mixtures may yield Anti-provocative, Anticancer, against ligament, antiulcer and antibacterial medications. This investigation will improve fundamental comprehension of the unrefined medication recognizable proof plan valuable in customary consideration

rehearses and could prompt opposite pharmacology by which society would get home grown medications at a moderate expense.

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**6. Conflict of interest**
The authors stated that no conflicts of interest.

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