ISSN: 0975-833X

*Available online at http://www.journalcra.com*

**INTERNATIONAL JOURNAL OF CURRENT RESEARCH**

*International Journal of Current Research*
*Vol. 13, Issue, 08, pp.18658-18660, August, 2021*

*DOI: https://doi.org/10.24941/ijcr.42067.08.2021*

**RESEARCH ARTICLE**

# ANTIMICROBIAL ACTIVITY AND GC-MS ANALYSIS OF PETROLEUM ETHER EXTRACT OF *SYZYGIUM CUMINI* (L.)

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**ARTICLE INFO**

***Article History:***
Received 25th May, 2021
Received in revised form
20th June, 2021
Accepted 23rd July, 2021
Published online 31st August, 2021

***Key Words:***
Antimicrobial,
Antiperspirant,
Zone of inhibition

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**ABSTRACT**

The petroleum ether extract of stem bark of *Syzygium cumini* (L.) was investigated for antimicrobial activity against Fungal isolates *Candida albicans*, *Microsporum audouinii*, *Trichophyton rubrum*, *Trichophyton mentagrophytes* and the bacterial isolates of *Staphylococcus aureus*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa* and *Bacillus pumilus* by disc diffusion method (Zone of Inhibition in mm at 100 µg / disc). It has been reported that petroleum ether extract of stem bark of *Syzygium cumini* (L.) showed appreciable inhibition against *Candida albicans* and *Trichophyton rubrum* (zone of inhibition 09 mm). GC-MS analysis of Petroleum ether extract of stem bark of *Syzygium cumini* L. shows the presence of four phytochemical compounds includes Cyclopentasiloxane, decamethyl-, 3-Dodecene (E) (%), 2-hexadecanol (%), 1-(+)–Ascorbic acid(%), 2,6-dihexadecanoate(%).



***Citation: Dr. Wanjare, P. D. and Dr. Surve, S. V.*** *"*Antimicrobial activity and GC-MS analysis of petroleum ether extract of *Syzygium cumini (L.)", 2021. International Journal of Current Research, 13, (08), 18658-18660.*

# INTRODUCTION

Family Myrtaceae consists of 121 genera with near about 5800 species of shrubs and trees distributed mainly in tropical and subtropical areas of the world (Stefanello *et al.*, 2011). The genus *Syzygium*, a leading member of the family, with 1100 species, which has been used in the treatment of numerous diseases, especially diabetes (Ayyanar and Subash-Babu, 2012). It is popularly known as jamun in India, black plum in Europe, jambolan in Spanish-spoken countries and jambolão in Brazil (Corrêa, 1974). The *Syzygium cumini* L. is commonly known as Malabar Plum or Black Plum, it is native to Indian Subcontinent and adjoining regions of Southeast Asia. Local medicine men use stem bark, leaves and seeds of this plants in various skin ailments. In the present research work the antimicrobial activity of Petroleum ether extract of *Syzygium cumini* L. used in the treatment of Skin Disease was analyzed against eight clinically significant organisms.

# MATERIAL AND METHODS

**Successive solvent extraction of plant material:** The stem bark of *Syzygium cumini* L. was collected and washed thoroughly and air dried under shade. After complete shade drying the plant material was grinded. The extraction was done by using Soxhlet's extraction method with analytical grade refluxing solvents like petroleum ether

**Antimicrobial Activity:** The extract was used for antimicrobial activity against pathogens e.g. Fungal isolates *Candida albicans, Microsporum audouinii, Trichophyton rubrum, Trichophyton mentagrophytes* and the bacterial isolates of *Staphylococcus aureus, Streptococcus pyogenes*, *Pseudomonas aeruginosa* and *Bacillus pumilus* by disc diffusion method (Zone of Inhibition in mm at 100 µg / disc).

**GC-MS (Gas Chromatography and Mass Spectroscopy):** The samples were subjected to GC-MS analysis from Central Instrumentation Laboratory (CIL), Punjab University Chandigarh. GC-MS analysis of the samples were carried out using Perkin Elmerclarus 680 with mass spectrometer clarus 600 (EI) using TurboMass ver 5.4.2 Software with NIST – 2008 Library ver. Mass spectra were recorded over 35-650 amu range with electron impact ionization energy 70 eV; a scan interval of 2 min and fragments from 50 to 600 Da. The chemical components form the different extract of plant were

identified by comparing the retention times of chromatographic peaks using Quadra pole detector with NIST Library to relative retention indices. Quantitative determinations were made by relating respective peak areas to TIC areas from the GC-MS.

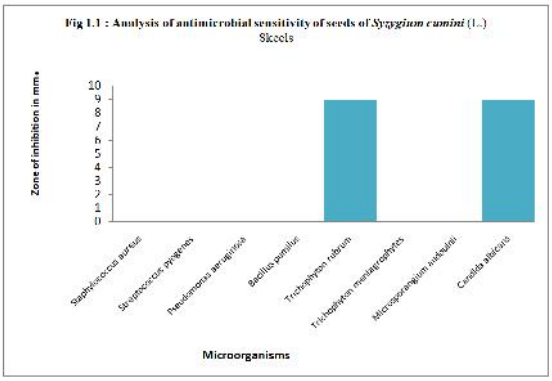
# RESULTS AND DISCUSSION

**Antimicrobial activity of stem bark extracts of *Syzygium cumini*** (L.) Skeels. Petroleum ether extract showed positive microbial zone of inhibition against pathogens *Candida albicans* and *Trichophyton rubrum*. The zone of inhibition of 9 mm against pathogen *Candida albicans* and *Trichophyton rubrum* were observed in Petroleum ether extract (Table 1.1). Petroleum ether extract was found non-reactive to other test organisms.

**Table 1.1: Antimicrobial activity of Stem bark extracts of *Syzygium cumini* (L.) Skeels. by disc diffusion method (Zone of Inhibition in mm at 100 µg / disc)**

| S. N. | Micro-organism | Petroleum ether |
|---|---|---|
| 1 | *Staphylococcus aureus* | 00 |
| 2 | *Streptococcus pyogenes* | 00 |
| 3 | *Pseudomonas aeruginosa* | 00 |
| 4 | *Bacillus pumilus* | 00 |
| 5 | *Trichophyton rubrum* | 9 mm |
| 6 | *Trichophyton mentagrophytes* | 00 |
| 7 | *Microsporangium audouinii* | 00 |
| 8 | *Candida albicans* | 9 mm |

**Data represented in mean of three replicates*



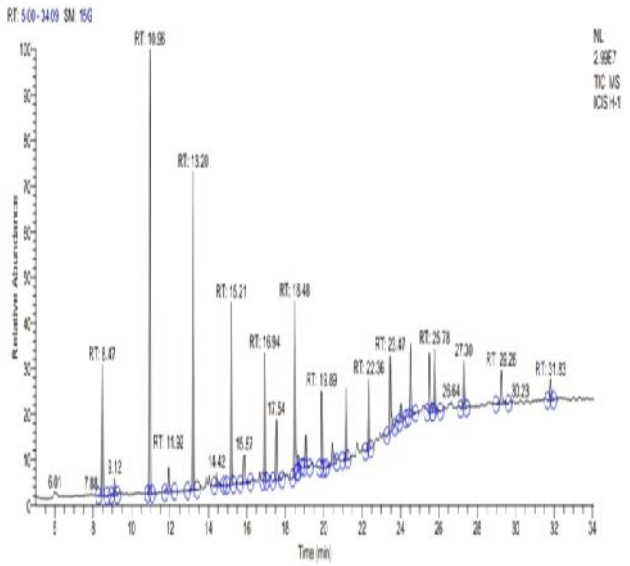
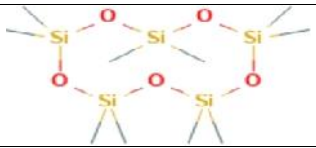
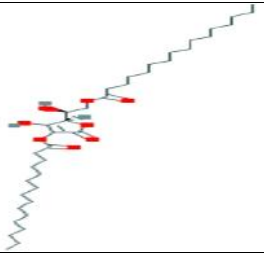



**Fig. 2.1.H1: GC-MS chromatogram of *Syzygium cumini*** L.

**2.1 H1: GC-MS analysis of *Syzygium cumini*** L. GC-MS was carried out to study and to determine the possible chemical components from stem bark of *Syzygium cumini* L. The chromatogram of Petroleum ether extract clearly shows the presence of four peaks indicating presence of four phytochemical compounds detected was shown in Fig. 2.1.H1.

The four phytoconstituents were characterized and identified on comparison of the mass spectra of the constituents provided by NIST library. The Petroleum ether extract of stem bark analyzed by GC-MS shows the presence of compounds like Cyclopentasiloxane, decamethyl-, 3-Dodecene (E), 2-hexadecanol, 1-(+)–Ascorbic acid 2,6-dihexadecanoate. The active compound with their retention time (RT), % peak area, Compound analyzed, molecular formula, molecular weight (MW), functional group, probable structural formula and activity reported are presented in Table- 2.2.H1

**Table 2.2 H1. GC-MS Analysis of *Syzygium cumini*** L

| Sr. No. | Retention Time | Peak area % | Compound Analyzed | Molecular formula | Probable Structural Formula | Activity reported |
|---|---|---|---|---|---|---|
| 1 | 8.47 | 6.74 | Cyclopentasiloxane, decamethyl- | $C_{10}H_{30}O_5Si_5$ |  | Antiperspirant, Suncreen |
| 2 | 9.12 | 1.06 | 3-Dodecene,(E) | $C_{12}H_{24}$ |  | Ectoparaticide, Edermatogenic |
| 3 | 14.42 | 0.95 | 2-hexadecanol | $C_{16}H_{34}O$ |  | Cleanser |
| 4 | 18.69 | 1.02 | 1-(+)-Ascorbic acid2,6-dihexadecanoate | $C_{38}H_{68}O_8$ |  | Antibacterial, Anticancer |

**Conclusion**

The present study incorporates antimicrobial activity and Gas chromatography and mass spectroscopic analysis of *Lawsonia inermis* L. The plant study was related to skin diseases. The plant species *Syzygium cumini* L. (Stem bark), petroleum ether extract was positive against pathogens *Trichophyton rubrum* and *Candida albicans.* It is concluded that the pathogen *Trichophyton rubrum* and *Candida albicans* were positive to plants which is used in skin diseases. Cyclopentasiloxane, decamethyl, obtained from GC-MS analysis of plant used as antiaging skin and hair conditioner, lubricant, antiperspirant scalp treatment, deodorant and skin lightener agents. This study would be precious and effective in cosmetology and treatment of skin diseases.

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