

1 Environmental Biotechnology Division, School of Bioscience and Technology, VIT University, Vellore 632 014, Tamilnadu, India
2 P.G. and Research Department of Zoology, Physiology Wing, Voorhees College, Vellore 632 001, Tamilnadu, India
3 Department of Biotechnology, School of Bioengineering, SRM University, Kattankulathur 603 203, Tamilnadu, India

Received on: 20-11-2009; Revised on: 16-12-2009; Accepted on: 04-02-2010

**ABSTRACT**

*Euphorbia hirta* L. (Euphorbiaceae) is a potent medicinal plant in the traditional Indian medicinal systems. Traditionally the leaves are used in the treatment of cough, corzya, hay asthma, bronchial infections, bowel complaints, worm infestations, wound, kidney stones and boils. In the present study leaves of *E. hirta* L. were collected during different time periods. The ethanol extract of the leaves of *E. hirta* L. was analyzed for their antimicrobial activity by agar well diffusion method against bacteria species namely *Staphylococcus aureus* (MTCC 2940), *Bacillus cererus*, *Salmonella typhi* (MTCC 733), *Klebsiella Pneumoniae* (MTCC139), *Pseudomonas aeruginosa* (MTCC 741), and fungus species namely *Aspergillus niger* (MTCC 277), *Aspergillus fumigatus* (MTCC 343), *Aspergillus flavus* (MTCC 418), *Rhizopus oryzae* (MTCC 262). It was observed that the leaves collected during mid August to December end showed significant antimicrobial effect compared to other extracts.

**Keywords:** Antimicrobial activity, Infection, Agar well diffusion method, *Euphorbia hirta* L.

**INTRODUCTION**

*Euphorbia hirta* L. (Euphorbiaceae), a wild herbaceous plant is very common in all tropical countries, including India. The stems are slender and often reddish in color, covered with yellowish bristly hairs especially in the younger parts. The leaves are oppositely arranged, lanceolate and are usually greenish or reddish, underneath measuring about 5 cm long. The stem and leaves produces white or milky juice when cut [1]. The plant has been widely acknowledged for the treatment of cough, corzya, hay asthma, bronchial infections, bowel complaints, worm infestations, kidney stones in traditional medicine [2]. In Nigeria, plant extracts or exudates of the plant are used as ear drops and in the treatment of boils, sore and promoting wound healing.

Earlier, bioactivity studies describe *E. hirta* L. as an potent medicinal plant and established its sedative and anxiolytic activity [3], analgesic, antipyretic, anti-inflammatory, antidepressant for blood pressure [4], antihypertensive [5] and Antioxidants [6]. Present study deals with the antibacterial and antifungal activity of the leaves collected at different times in a year.

**Plant material collection and Preparation of extracts**

The leaves of *E. hirta* L. were collected from the campus of VIT-University, Vellore, TN, India, and authenticated a voucher specimen (CAHC 147) of the plant was kept at the Department of Botany, C. Abdul Hakeem College, Melvisharam, Vellore, TN, India. The leaves were collected during different seasons like January to mid March (Spring), mid March to May end (Summer), June to mid August (Autumn) and Mid August to December (Winter). The leaves washed with distilled water and shade dried, coarsely powdered. The ethanol extracts was prepared for all samples separately by maceration.

**Test microorganisms**

The following microorganisms were used for the study: *S. aureus* (MTCC 2940), *B. cererus* (MTC 287), *S. typhi* (MTCC 733), *K. pneumoniae* (MTCC139), *P. aeruginosa* (MTCC 741), *A. niger* (MTCC 277), *A. fumigatus* (MTCC 343), *A. flavus* (MTCC 418), *R. oryzae* (MTCC 262). All the stock cultures were obtained from IMTECH, India.

**Antimicrobial activity study**

The extracts obtained from the leaves were analyzed for their antibacterial and antifungal activity by agar well diffusion method [7]. A loop full of test cultures was inoculated aseptically in a conical flask containing 30 ml of nutrient broth (NB) and saubouraud dextrose broth(SDB) separately. The flasks were incubated for 72 hours to get active strain. The saubouraud dextrose agar (SDA) and nutrient agar (NA) was poured into petriplates for fungus and bacterial cultures respectively. After solidification 0.25 ml of test strains were inoculated in the agar plates separately. Three wells were made in the plates with sterile borer (4 mm). The plant extract (50 µl) was introduced into the well and plates were incubated at 37°C for 72 hours. The experiment was performed under strict aseptic conditions. All the experiments were performed in triplicates. Microbial growth was determined by measuring the diameter of zone of inhibition [8]. Ciprofloxacin (30µg/disc) and ketoconazole (30µg/disc) was kept as positive control for bacteria and fungal cultures respectively.
Statistical analysis

The results were expressed as mean ± S.E.M. Statistical analysis of the data were carried out using Student’s ‘t’-test and the results were considered significant when P < 0.05.

RESULT AND DISCUSSION

The antimicrobial activity of the four different seasonal collections of plant extracts is reported in Table 1. It was observed that all the four extracts showed significant antimicrobial activity. The extract of the leaves were collected during mid August to December end showed significantly higher antimicrobial activity in comparison to the other three extracts. Phytochemical studies on E. hirta L. leaves revealed the presence of tannins, flavonoids alkaloids, glycosides, proteins, sterols and saponins [9,10]. The antimicrobial activity of E. hirta L. may be due to one/more group of above phytoconstituent(s). This study suggests that the plants contain higher amounts of antimicrobial constituents in the period between mid August to December end.

ACKNOWLEDGEMENTS

Authors are thankful to VIT-University, Vellore, Tamilnadu, India for providing laboratory facilities to carry out this study.

REFERENCES


Table 1 Antimicrobial activity of Euphorbia hirta L. ethanol leaf extracts

<table>
<thead>
<tr>
<th>Micro organisms</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Control I</th>
<th>Control II</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus</td>
<td>11.2±0.09</td>
<td>8.2±0.15</td>
<td>11.2±0.14</td>
<td>16.1±0.04</td>
<td>23.1±0.13</td>
<td>-</td>
</tr>
<tr>
<td>B. cereus</td>
<td>9.2±0.13</td>
<td>7.4±0.01</td>
<td>9.2±0.12</td>
<td>12.1±0.12</td>
<td>22.1±0.15</td>
<td>-</td>
</tr>
<tr>
<td>S. typhi</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>23.2±0.16</td>
<td>-</td>
</tr>
<tr>
<td>K. pneumoniae</td>
<td>7.2±0.09</td>
<td>6.1±0.11</td>
<td>6.1±0.01</td>
<td>9.2±0.01</td>
<td>19.6±0.01</td>
<td>-</td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>12.1±0.20</td>
<td>10.1±0.03</td>
<td>11.2±0.01</td>
<td>13.1±0.05</td>
<td>21.3±0.01</td>
<td>-</td>
</tr>
<tr>
<td>A. niger</td>
<td>12.1±0.15</td>
<td>11.2±0.21</td>
<td>12.1±0.20</td>
<td>13.9±0.11</td>
<td>-</td>
<td>22.3±0.03</td>
</tr>
<tr>
<td>A. fumigatus</td>
<td>11.1±0.10</td>
<td>9.9±0.17</td>
<td>10.2±0.05</td>
<td>11.2±0.06</td>
<td>-</td>
<td>22.3±0.20</td>
</tr>
<tr>
<td>A. flavus</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20.0±0.04</td>
</tr>
<tr>
<td>Rhizopus oryzae</td>
<td>8.3±0.10</td>
<td>9.9±0.17</td>
<td>7.0±0.11</td>
<td>9.2±0.11</td>
<td>-</td>
<td>23.2±0.17</td>
</tr>
</tbody>
</table>

A - January to mid March (spring),  B- mid March to May end (summer),  C- June to mid August (Autumn),  D- Mid August to December (Winter),  Control I- Ciprofloxacin,  Control II- Ketoconazole,  '-' indicates no activity,  Mm- Milli meter.