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# Antibacterial Activity of Various Leaf Extracts of *Dendrophthoe Falcata* (L.F) Ettingsh Found on *Buchnania Lanzan* and *Mallotus Philippensis*

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**ABSTRACT**:
Plants have been used in traditional medicinal system for centuries. Medicinal plants have received considerable attention from the researchers for evaluation of their bioactivity. As a part of our on-going research of screening the aqueous, ethanol, chloroform and methanol fractions of *D. falcata* leaves collected from the hosts *B. lanzan* and *M. philippensis* have been chosen for the present study from the Melghat forest region of West Vidarbha region. In the antibacterial activity, the result showed that four fractions of *D. falcata* leaves exhibited strong to moderate activity against the micro-organisms i.e. *S. aureus*, *E. coli* and *P. aeruginosa*. Among the extracts ethanol and aqueous fraction showed promising results.
**Keywords:** *D. falcata* leaves, *B. lanzan*, *M. philippensis*, antibacterial, *S. aureus, P. aeruginosa, E. coli,* etc.

## INTRODUCTION:

Human pathogenic microorganisms have known to develop resistance in response to the indiscriminate use of commercial antimicrobial drugs commonly employed in the treatment of infectious diseases. Such situation, the undesirable side effect of certain antibiotics, and the emergence of previously uncommon infections, has forced scientists to look for new antimicrobial substitutions from various sources such as medicinal plants (Dorbat *et al.*, 2007). The screening of plant extracts and plant products for antimicrobial activity has shown that plants represent a potential source of new anti-infective agents (Anjana *et al.*, 2009).

*Dendrophthoe falcata* (L.f.)Ettingsh (Family- Loranthaceae) is a large bushy parasitic shrub with grey bark, thick usually opposite leaves, orange-red or scarlet flowers and ovoid – oblong berries (Kumar *et al.* 1984.) It is also known as *Loranthus falcatus* Linn. f. It is indigeneous to India, Srilanka, Thialand, Indo-China and Australia. The numbers of host reported for this parasite is over 3009. About 7 species are found in India. The bark has narcotic properties. It is used in wounds and menstrual troubles and also as a remedy in consumption, asthma and mania. The bark is used as a substitute for betel-nut (Chopra *et al.* 1956). *Dendrophthoe falcata* is reported to contain biological active substances such as flavonoid, quercetin, kempferol, rutin (Ramchandran *et al.* 1999), tannins, β-sitosterol, stigmasterol, β-amyrin, oleanolic acid (Anjaneyula *et al.* 1993).

## MATERIALS AND METHODS

### Plant material

The *D. falcata*leaves were collected from the hosts *Buchnania lanzan* Spreng. and *Mallotus philippensis* (Lamk.) Muell. Arg. during March-April of 2015 from Melghat forest region of West Vidarbha, Maharashtra and were authenticated by Department of Botany. The voucher specimens were kept in the Department of Botany in Shri Shivaji College of Arts, Commerce and Science, Akola, Maharashtra, India.

### Extraction procedure

Shade dried leaves were finely powdered and subjected to successive solvent extraction by continuous Soxhlet extraction. The extraction was done with different solvents with respect to their increasing order of polarity such as Chloroform, Methanol, Ethanol and water. All the extracts were concentrated by distilling the solvent in a rotary flash evaporator. The dried extracts were dissolved in respective solvents with concentration 0.1mg/ml and subjected to antibacterial activity.

### Test organisms

The bacterial spp. used for the test were *Staphylococcus aureus*(*S. aureus*), *Escherichia coli*(*E. coli*) and *Pseudomonas aeruginosa*(*P. aeruginosa*). All the stock cultures were obtained from Microbiology lab, Shri Shivaji College of Arts, Commerce and Science, Akola, Maharashtra, India.

### Culture media and inoculums preparation

Nutrient agar /broth (Himedia, India.) were used as the media for the culturing of bacterial strains. Loops full of all the bacterial

cultures were inoculated in the nutrient broth at 37 $^0$C for 72 hrs.

**Preliminary phytochemical screening**

All the extracts were subjected to preliminary phytochemical qualitative screening for the presence or absence of various primary or secondary metabolites (Harborne, 1973).

**Antibacterial activity**

The extracts obtained above were screened for their antibacterial activity in comparison with standard antibiotic penicillin (100 µg/mL) in-vitro by disc diffusion method (Laouer *et al.*, 2009) using *S. aureus*, *E. coli* and *P. aeruginosa* as test organisms. Each extract was individually loaded on the 3 mm sterile disc at the concentration of 0.1 mg/mL. The results were recorded by measuring the zone of growth inhibition surrounding the disc. The experiments were done in triplicate.

**Statistical analysis**

The results were expressed as mean ± SEM. Statistical analysis of the data were carried out using Student's t-test and the results were considered significant when $P<0.05$.

**RESULTS**

The results of antibacterial activity are given in the Table 1, which antibacterial activity of all the extracts against the entire tested organisms. Aqueous and ethanol extracts have shown better activity than the rest of the solvent extracts against all the three microorganisms. Aqueous and Ethanolic extract of *D. falacata* leaves on *B. lanzan* was more effective against *S. aureus*,*E. coli* and *P. aeruginosa*, while chloroform extract showed a good inhibition zone for *S. aureus*.

Aqueous extract of *D. falcata* leaves on *M. philippensis* showed better activity against all the micro-organisms, while ethanolic extract showed the activity only against *S. aureus*.The presences of various phytochemicals are shown in Table 2 and Table 3. The results showed that, the phytoconstituents change with the change in host of the hemiparasite, hence, also changes the antibacterial activity.

**Table 1**: Antibacterial activity of different extracts of leaves of *D. falcata* (Mean±SEM) (mm).

| **Antibacterial activity tested for** | **Zone of Inhibition** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *S. aureus* | | | | *E. coli* | | | | *P. aeruginosa* | | | |
| | CE | ME | EE | AE | CE | ME | EE | AE | CE | ME | EE | AE |
| *D. falcata* leaves Host: *B. lanzan* | **20±0.1** | **9.5±0.2** | **24±0.1** | **23±0.21** | **Nil** | **12.5±0.08** | **18±0.1** | **18.2±0.1** | **Nil** | **12.5±0.1** | **20.5±0.2** | **19±0.1** |
| *D. falcata* leaves Host: *M. philippensis* | **Nil** | **Nil** | **16.1±0.1** | **21±0.11** | **Nil** | **7 ±0.13** | **16±0.2** | **16.5±0.16** | **Nil** | **Nil** | **Nil** | **17±0.1** |
| Penicillin | **16.01 ±0.14** | | | | **16.09 ±0.19** | | | | **16.02 ±0.18** | | | |

CE: Chloroform extract, ME: Methanol extract, EE: Ethanol extract, AE: Aqueous extract

**Table 2:** Phytochemical analysis of *D. falacata* leaves on *B. lanzan* extracted with different solvents.

| **Phytoconstituents** | **CE** | **ME** | **EE** | **AE** |
|---|---|---|---|---|
| Carbohydrates | - | - | - | + |
| Proteins | - | - | - | + |
| Anthraquinone | - | + | + | - |
| Cardiac Glycosides | + | + | + | + |
| Caumarins | - | + | + | - |
| Quinone | - | + | + | - |
| Steroids | - | - | - | - |
| Alkaloids | - | - | - | - |
| Flavonoids | + | + | - | + |
| Phenolics & Tannins | - | + | + | + |
| Saponin | - | + | - | + |
| Terpenoids | - | - | - | - |

CE: Chloroform extract, ME: Methanol extract, EE: Ethanol extract, AE: Aqueous extract

**Table 3:** Phytochemical analysis of *D. falacata* leaves on *M. philippensis* extracted with different solvents.

| **Phytoconstituents** | **CE** | **ME** | **EE** | **AE** |
|---|---|---|---|---|
| Carbohydrates | - | - | - | + |
| Proteins | - | - | - | + |
| Anthraquinone | - | + | + | - |
| Cardiac Glycosides | + | + | + | + |
| Caumarins | - | + | + | - |
| Quinone | - | + | + | + |
| Steroids | + | - | - | + |
| Alkaloids | + | - | - | + |
| Flavonoids | - | + | + | + |
| Phenolics & Tannins | - | + | + | + |
| Saponin | + | - | - | + |
| Terpenoids | - | - | - | - |

CE: Chloroform extract, ME: Methanol extract, EE: Ethanol extract, AE: Aqueous extract

**DISCUSSION**

The therapeutic value of medicinal plants lies in the various chemical constituents present in it. The bioactivity of plant extracts is attributed to phytochemical constituents. For example, plants those are rich in tannin content show remarkable antibacterial potential due to the basic character that allows them to react with proteins, to form stable water soluble compounds thereby killing the bacteria directly by damaging its cell membrane (Mohamed *et al.*, 2010). Flavonoids are a major group of phenolic compounds reported for their antiviral (Mehrangiz *et al.*, 2011), antimicrobial (Maria Lysete *et al.*, 2009) and spasmolytic properties (Julianeli *et al.*, 2011). Alkaloids isolated from plants are in general are found to have antimicrobial properties (Ahmed *et al.*, 2010). The antibacterial activity of *D. falcata* leaves, therefore, can be attributed to the presence of phytochemicals viz. flavonoids, alkaloids, tannins, glycosides in methanolic, ethanolic and aqueous extracts.

It is concluded that the plant extract possess antibacterial activity against tested organisms. The zone of inhibition varied, suggesting the varying degree of efficacy and different phytoconstituents of herb on the target organism. The antibacterial activity of the plants may be due to the presence of various active principles in the leaves of *D. falcata*. Further studies are needed to isolate and characterize the bioactive principles to develop new antibacterial drugs.

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