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# Studies on antimicrobial potential of some selected medicinal plants of Marathwada region

**Bhagat A P[1], A S Bhuktar[2]**
[1] Department of Botany, Late Pushpadevi Patil Arts and Science College Risod, Washim, Maharashtra, India
[2] Department of Botany, Vivekanand Arts Sardar Dalipsingh Commerce and Science College, Samarth Nagar, Aurangabad, Maharashtra, India

**Abstract**
In this present investigation 21 medicinal plants are selected from Marathwada region which are abundantly grown in marathwada region. Most of the Ayurvedic practitioner are used these plants against various diseases as a medicines. To investigate antimicrobial properties of selected medicinal plants, various extracts are prepared by solvent extraction and then experiment was carried out by disc diffusion (6mm disc) method. Experiment was conducted by using ethanol and methanol extracts of different plant parts like root, stem, leaf, flowers, fruits or whole plant. In order to examine antimicrobial properties of crud extracts the selected human pathogens such as *Salmonella typhi* ATCC 10749, *Shigella dysenteriae* ATCC 9752, *Pseudomonas aeruginosa* ATCC9027 *Candida albicans* ATCC10231, *Cryptococcus neoformans* (Hospital Strain) against the 50 µl concentration of plant extract. Then they are compared with the ±ve control Amoxicillin and Amphotericine B while –ve control is methanol and ethanol. Obtained results indicates that *Balanites aegyptica* (L.) Delile., *Capparis zeylanica* L., *Blepharis repens* (Vahl) Roth., *Basella alba* L., and *Acalypha indica* L. showed highest antibacterial and antifungal activity against tested bacteria. The remaining are more and less resistances against the selected micro-organisms.

**Keywords:** antimicrobial activity, Medicinal plants, human pathogens

## Introduction

Medicinal plants have many natural biochemical or phytochemicals within each and every plant parts, called as secondary metabolites and they possesses ability to cure various diseases In that sense antimicrobial activity is conducted in this present investigation.

Bacteria like *Salmonella typhi*, *Shigella dysenteriae* and *Pseudomonas aeruginosa* causes infectious diseases which results into many deaths worldwide. Even though pharmaceutical industries have produced new antimicrobial drugs in last decades but microrganisms acquired resistance to them (Parekh J. and Chanda S 2007) [9] and *Candida albicans* cause human infections and near about 30 sp. are in clinical importance (Pfuller *et al*., 2011) [10]. Throughout the previous years, the frequency of contaminations triggered by *Candida* genus has increased significantly (Sobel *et al*., 2007) [12], *C. albicans* is the species that is most frequently isolated in cases of candidiasis (45–50%) (Del Palacio *et al* 2009) [5] *Cryptococcus neoformans* is the etiological agent of the cryptococcosis, a systemic mycosis with dissemination to central nervous system causing meningoencephalitis and primarily affecting immunocompromised patients such as HIV-positive patients (Maziarz and Perfect 2016, Rajasingham *et al*., 2016, Beardsley *et al*., 2019) [7, 11, 3].

Angalaparameswari *et al;* (2012) [1], described anti-microbial activity of aristolochic acid I, extracted from the roots of *Aristolochia bractiolata* Lamk. Kavitha and Nirmaldevi (2009) [6] determined its antimicrobial activity against *Escherichia coli, Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas fluorescens, Shigella flexneri, Proteus vulgaris* (bacteria) and *Aspergillus niger, A. terreus, Penicillium notatum* and *Rhizopus stolonifer* (fungi) by disc diffusion method and concluded that the plant has pronounced antibacterial and antifungal activities. Natarajan *et al;* (2010) [8] studied antibacterial activity of *Biophytum sensitivum* (L.) DC. leaf extracts against human pathogenic bacterial strains (*Bacillus subtillis, Staphylococcus aureus, Streptococcus pneumonia, Klebsiella pneumonia, Salmonella typhi, Proteus vulgaris and Escherichia coli*) by agar well diffusion method. During this study, methanol and chloroform extracts showed better antibacterial activity against all the test organisms.

## Material and Methods

Antimicrobial activity was mainly focused on to investigate the antibacterial and antifungal potentials of various extracts of selected plants or plant parts. Out of these selected medicinal plants some are still not systematically investigated (table no. 2) plants are selected for Antibacterial and Antifungal Activity. In order to evaluation of the prepared solvent extract of selected plant species were screened against the following organisms and compared with their ± ve and –ve controls.

**Table 1:** Selected Microorganisms

| No | Organisms | ±ve Control | -ve Control |
|---|---|---|---|
| | **Bacteria** | | |
| 1. | *Salmonella typhi* ATCC 10749 | Amoxicillin | Methanol |
| 2. | *Shigella dysenteriae* ATCC 9752 | Amoxicillin | Ethanol |
| 3. | *Pseudomonas aeruginosa* ATCC9027 | Amoxicillin | Methanol |
| | Fungi | | |
| 1. | *Candida albicans* ATCC10231 | Amphotericine B | Methanol |
| 2. | *Cryptococcus neoformans* (Hospital Strain) | Amphotericine B | Ethanol |

The inoculums were prepared by inoculating a loopful of above mentioned organisms into a 3 ml sterile nutrient broth tube and incubated at $37^0$ C for 6-8 hours. The turbidity was matched with 0.5 Mc Farland's Nephelometer Standard. Dilution to the tube was done with sterile nutrient broth to get a cell density.

The antifungal and antibacterial screening were carried out on methanol and ethanol samples of selected medicinal plants. The antimicrobial screening was performed by disc diffusion method as stated by Bauer *et al;* (1966) [2] and National Committee for clinical laboratory standards (NCCLS, 1999). The Petri plats 15ml of sterile Hi-Media for bacteria and Potato Dextrose Agar (PDA) for fungi was seeded with the appropriate bacterial suspension and fungal suspension was inoculated with 100µl on medium layer. For agar disc diffusion method, the 6mm sterile filter paper discs of Whatman No. 1 was saturated with prepared extracts about 100µl and allowed it to the dry and introduced on the seeded layer of agar plate. The plates were incubated overnight at $37^0$C for bacteria and for fungi incubated at 25 °C for 72 h. The result was determined by measuring the diameter of zone as zone of inhibition. The experiments were set in triplets at a time and average values are presented. The cultures of test organisms were collected from Shradhha Analytical Services, Ghatkoper, Mumbai in support of technical help for antimicrobial activity.

**Table 2:** selected Medicinal Plants

| No. | Species Name | Family | Crud drug | Field No. | Locality |
|---|---|---|---|---|---|
| 1. | *Capparis decidua* (Forssk) Edgew. | Capparidaceae | Fruits | APB 101 | Gangapur,VaijapurRoad,Aurangabad |
| 2. | *Capparis zeylanica* L. | Capparidaceae | Fruits | APB 106 | *Nanded Forest,* Nanded |
| 3. | *Biophytum sensitivum* (L.) DC. | Oxalidaceae | Fruits | APB 103 | *Gautala Forest,* Aurangabad |
| 4. | *Balanites aegyptica* (L.) Delile. | Balanitaceae | Fruits | APB 109 | *Waluj Road,* Aurangabad |
| 5. | *Cassine albens* (Retz.) Kosterm. | Celastraceae | Leaves | APB 110 | *Gautala Forest,* Aurangabad |
| 6. | *Cissus quadrangularis* L. | Vitaceae | Stem | APB 115 | *Milind College,* Aurangabad |
| 7. | *Cardiospermum halicacabum* L. | Sapindaceae | Whole Plant | APB 133 | *Aurangabad Distric* |
| 8. | *Crotalaria verrucosa* L. | Fabaceae | Leaves | APB 118 | *Nipatniranjan,* Aurangabad |
| 9. | *Enicostema axillare* (Poir.ex.Lam.)A. Raynal | Gentianaceae | Whole Plant | APB 119 | *Aurangabad Distric* |
| 10. | *Convolvulus arvensis* L. | Convolvulaceae | Whole Plant | APB 127 | *Bajara research center,* Aurangabad |
| 11. | *Evolvulus alsinoides* (L.) L. | Convolvulaceae | Whole Plant | APB 124 | *Soneri Mahal* Aurangabad |
| 12. | *Blepharis repens* (Vahl) Roth. | Acanthaceae | Whole Plant | APB 128 | *Dr. B.A.M. University* Aurangabad |
| 13. | *Rotheca serrata* (L.) Steane & Mabb. | Verbenaceae | Leaves | APB 142 | *Khulttabad,* Aurangabad |
| 14. | *Boerhavia erecta* L. | Nyctanginaceae | Root | APB 136 | *Aurangabad Distric* |
| 15. | *Boerhavia diffusa* L. | Nyctanginaceae | Root | APB 137 | *Aurangabad Distric* |
| 16. | *Celosia argentiea* L. | Amaranthaceae | Seeds | APB 160 | *Aurangabad Distric* |
| 17. | *Basella alba* var. *rubra* L. | Basellaceae | Fruits | APB 163 | *Chauka forest,* Aurangabad |
| 18. | *Aristolochia bracteolata* Lamk. | Aristolochiaceae | Whole Plant | APB 169 | *Bajara research center,* Aurangabad |
| 19. | *Acalypha indica* L. | Euphorbiaceae | Leaves | APB 151 | *Aurangabad Distric* |
| 20. | *Chlorophytum tuberosum* (Roxb.) Baker | Liliaceae | Tubers | APB 154 | *Gogababa Hills* Aurangabad |
| 21. | *Cyperus rotundus* L. | Cyperaceae | Tubers | APB 155 | *Aurangabad Distric* |

## Result and Disscusion

Present investigation is carried out on 21 medicinal plants which are abundantly grown in marathwada region. Most of the Ayurveda practitioners are used these plants against various diseases as a medicine. Out of 21 plants 14 plants has shown minimum and Maximum Zone of Inhibition. Then out of 14 resistant plant 12 plants show Maximum Zone of inhibition and 2-plants gives 7±25 mm ie. minimum zone of inhibition While 7 plants namely *Biophytum sensitivum* (L.) DC., *Cissus quadrangularis* L., *Convolvulus arvensis* L., *Boerhavia erecta* L., *Boerhavia diffusa* L., *Celosia argentiea* L. and *Cyperus rotundus* L. does not shown any zone of inhibition and thus they are susceptible to this Selected Bacteria and Fungi nevertheless these plants have countless medicinal Properties and that's why rather than this outcomes it needs further investigation.

### 1. *Capparis deciduas* (Forssk) Edgew.

The 50 µl crude methanols extract of flower and fruits of *C. decidua* (Forssk) Edgew. were screened against three bacterial and two fungal human pathogens and they showed 9±0.25 mm maximum zone of inhibition against *Salmonella typhi* ATCC 10749. In this way they showed antimicrobial properties. While *Shigella dysenteriae* ATCC 9752, *Pseudomonas aeruginosa* ATCC9027 *Candida albicans* ATCC10231, *Cryptococcus neoformans* did not showed any inhibition zone against the extract and thus they were sensitive against the plant extract.

### 2. *Capparis zeylanica* L.

The 50 µl crud methanol extract of fruits of ***C. zeylanica* L.** were screened against three bacterial and two fungal human pathogens and they showed ca. average 7±0.00 mm minimum zone of inhibition against *Salmonella typhi* ATCC 10749, ca. average 7±0.00 mm minimum zone of inhibition against *Pseudomonas aeruginosa* ATCC9027 and ca. average 8±0.00 mm minimum zone of inhibition against *Candida albicans* ATCC10231 and thus they were showing antimicrobial properties. While bacterium *Shigella dysenteriae* ATCC 9752 and fungi *Cryptococcus neoformans* did not showed any inhibition zone against extract and thus they were sensitive against plant extract and needs further investigation.

### 3. *Balanites aegyptica* (L.) Delile.

The 50 µl crud methanol extract of fruit pericarp of *Balanites aegyptica* (L.) Delile. were screened against three bacterial and two fungal human pathogens. Obtained results shows ca. average 9±0.00 mm zone of inhibition against *Salmonella typhi* ATCC 10749, ca. average 11±0.00 mm zone of inhibition against *Shigella dysenteriae* ATCC 9752, ca. average 7±0.00 mm minimum zone of inhibition against *Pseudomonas aeruginosa* ATCC9027, ca. average 22±0.00 mm maximum zone of inhibition against *Candida albicans* ATCC10231 and ca. average 8±0.00 mm minimum zone of inhibition against *Cryptococcus neoformans*. From

experimental results it was clear that, extract of fruit pericarp of *Balanites aegyptica* (L.) Delile. is highly effective against pathogen under investigation which showed highest antimicrobial properties.

**4. *Cassine albens* (Retz.) Kosterm.**

The 50 µl crud methanol extract of leaf and bark of *Cassine albens* (Retz.) Kosterm. were screened against three bacterial and two fungal human pathogens and from that *Shigella dysenteriae* ATCC 9752 shows ca. average 10±0.50 mm maximum zone of inhibition. Simultaneously the obtained results show crud methanol extract of leaf and bark of *Cassine albens* (Retz.) Kosterm. does not shown any zone of inhibition against *Salmonella typhi* ATCC 10749, *Pseudomonas aeruginosa* ATCC9027, *Candida albicans* ATCC10231, *Cryptococcus neoformans* rather than this it needs further investigation.

**5. *Cardiospermum halicacabum* L.**

Similarly 50 µl crud methanol extracts of whole plant of *Cardiospermum halicacabum* L. were screened against three bacterial and two fungal human pathogens and from that *Shigella dysenteriae* ATCC 9752 shows average 8±0.50 mm minimum zone of inhibition. Simultaneously the results obtained show that crude methanol extract of whole plant of *Cardiospermum halicacabum* L. does not showed any zone of inhibition against *Salmonella typhi* ATCC 10749, *Pseudomonas aeruginosa* ATCC9027, *Candida albicans* ATCC10231, and *Cryptococcus neoformans* and it needs further investigation.

**6. *Enicostema axillare* (Poir. Ex Lam.) A. Raynal**

The 50 µl crud methanol extract of whole plant of *Enicostema axillare* (Poir. Ex Lam.) A.Raynal were screened against three bacterial and two fungal human pathogens and they showed ca. average 10±0.25 mm maximum zone of inhibition against *Salmonella typhi* ATCC 10749. Simultaneously the obtained results shows crud methanol extract of whole plant of *E. axillaare* (Poir. Ex Lam.) A.Raynal does not showed any zone of inhibition against the *Shigella dysenteriae* ATCC 9752, *Pseudomonas aeruginosa* ATCC9027, *Candida albicans* ATCC10231, *Cryptococcus neoformans*. The overall observations indicate that they are resistant against plant extract.

**7. *Evolvulus alsinoides* (L.) L.**

Similarly the 50 µl crud methanol extracts of whole plant of *Evolvulous alsinoides* (L.) L. were screened against three bacterial and two fungal human pathogens and from that *Shigella dysenteriae* ATCC 9752 shows ca. average 9±0.50 mm maximum zone of inhibition. Simultaneously the obtained results showed crud methanol extract of whole plant of *E. alsinoides* (L.) L. does not showed any zone of inhibition against *Salmonella typhi* ATCC 10749, *Pseudomonas aeruginosa* ATCC9027, *Candida albicans* ATCC10231, *Cryptococcus neoformans* The observations indicate that they are resistant against plant extract, and thus it needs further investigation.

**8. *Blepharis repens* (Vahl) Roth.**

The 50 µl crud methanol extract of whole plant of *Blepharis repens* (Vahl) Roth. were screened against three bacterial and two fungal human pathogens and they showed ca. average 9±0.50 mm maximum zone of inhibition against *Salmonella typhi* ATCC 10749, ca. average 8±0.25 mm minimum zone of inhibition against *Pseudomonas aeruginosa* ATCC9027 and ca. average 11±0.50 mm maximum zone of inhibition against *Candida albicans* ATCC10231 and thus they were showing antimicrobial properties. Simultaneously obtained results showed crud methanol extract of whole plant of *Blepharis repens* (Vahl) Roth. does not shown any zone of inhibition against *Shigella dysenteriae* ATCC 9752 and fungi *Cryptococcus neoformans* against extract. This indicate that they are resistant against plant extract, and thus it needs further investigation.

**9. *Rotheca serrata* (L.) Steane & Mabb.**

The 50 µl crud methanols extract of leaf of *Rotheca serrata* (L.) Steane & Mabb. were screened against three bacterial and two fungal human pathogens and they showed ca. average 9±0.50 mm maximum zone of inhibition against fungi *Cryptococcus neoformans* and thus they were showing antimicrobial properties. Simultaneously obtained results show crud methanol extract of leaf of *Rotheca serrata* (L.) Steane & Mabb. does not shown any zone of inhibition against *Shigella dysenteriae* ATCC 9752, *Salmonella typhi* ATCC 10749, *Pseudomonas aeruginosa* ATCC9027 and fungi *Candida albicans* ATCC10231 against the extract and thus it needs further investigation.

**10. *Basella alba* L.**

The 50 µl crud methanol extract of seeds of *Basella alba* L. were screened against three bacterial and two fungal human pathogens and they showed ca. average 7±0.50 mm minimum zone of inhibition against *Salmonella typhi* ATCC 10749, ca. average 7±0.25 mm minimum zone of inhibition against *Pseudomonas aeruginosa* ATCC9027 and ca. average 7±0.50 mm minimum zone of inhibition against *Candida albicans* ATCC10231 and thus they were showing antimicrobial properties. Simultaneously obtained results show crud methanol extract of seed of *Basella alba* L. does not shown any zone of inhibition against *Shigella dysenteriae* ATCC 9752 and fungi *Cryptococcus neoformans* against prepared extract and resulting observation shows that they are being as resistant against the same plant extract and thus it needs further investigation.

**11. *Aristolochia bracteolata* Lamk.**

Similarly the 50 µl crud ethanol extracts of whole plant of *Aristolochia bracteolata* Lam. were screened against three bacterial and two fungal human pathogens and from that *Shigella dysenteriae* ATCC 9752 shows ca. average 16±0.07 mm maximum zone of inhibition. Simultaneously obtained results showed crud methanol extract of whole plant of *Aristolochia bracteolata* Lam. does not shown any zone of inhibition against the *Salmonella typhi* ATCC 10749, *Pseudomonas aeruginosa* ATCC9027, *Candida albicans* ATCC10231, *Cryptococcus neoformans* and resulting observation shows that they are being as resistant against same plant extract and thus it needs further investigation.

**12. *Acalypha indica* L.**

The 50 µl crud methanol extract of leaves of *Acalypha indica* L. were screened against three bacterial and two fungal human pathogens and they showed ca. average 8±0.50 mm minimum zone of inhibition against *Salmonella*

*typhi* ATCC 10749, ca. average 8±0.25 mm minimum zone of inhibition against *Pseudomonas aeruginosa* ATCC9027 and ca. average 8±0.50 mm minimum zone of inhibition against *Candida albicans* ATCC10231 and thus they were showing antimicrobial properties. Simultaneously the obtained results show crud methanol extract of leaves of *A. indica* L. does not shown any zone of inhibition against *Shigella dysenteriae* ATCC 9752 and fungi *Cryptococcus neoformans* against prepared extract and resulting observation shows that they are being as resistant against the same plant extract and thus it needs further investigation.

### 13. *Chlorophytum tuberosum* (Roxb.) Baker

The 50 µl crud methanol extract of tubers of *Chlorophytum tuberosum* (Roxb.) Baker were screened against three bacterial and two fungal human pathogens and they showed ca. average 8±0.50 mm minimum zone of inhibition against *Salmonella typhi* ATCC 10749, ca. average 7±0.25 mm minimum zone of inhibition against *Shigella dysenteriae* ATCC 9752 and thus they were showing antimicrobial properties. Simultaneously the obtained results show crud methanol extract of tuber of *C. tuberosum* (Roxb.) Baker does not shown any zone of inhibition against *Pseudomonas aeruginosa* ATCC9027 and fungi *Cryptococcus neoformans*, *Candida albicans* ATCC10231 against prepared extract and resulting observation shows that they are being as resistant against same plant extract and thus it needs further investigation.

### 14. Control

All above plant extracts are compared with the +ve control Amoxicillin against selected Bacterial Strains and Amphotericine B for Human Fungal Pathogens while –ve control is methanol and ethanol does not shown any zone.

### 15. Amoxicillin

Amoxicillin is an antibacterial antibiotics which is used against various infectious diseases caused by bacteria. Obtained results shows c.a. mean 35+0.00 mm zone of inhibition against the *Salmonella typhi* ATCC 10749, c.a. mean 28+0.00 mm zone of inhibition against the *Shigella dysenteriae* ATCC 9752, c.a. mean 25+0.00 mm zone of inhibition against the *Pseudomonas aeruginosa* ATCC9027, From the experimental results it was clear that the drug Amoxicillin is highly effective against the selected pathogen which are showing highest resistance with high antibacterial properties. But in certain cases these bacteria becomes resistance to Amoxicillin so the above mentioned plant extracts are the reliable sources for bacterial infections.

### 16. Amphotericine B

Amphotericine B is an antifungal drug which is used against various infectious diseases caused by fungi. From the experimental results Amphotericine B was used against the fungal human pathogens that has shown higher zone of inhibition. The obtained results were shows c.a. mean 9+0.00 mm zone of inhibition against the *Candida albicans* ATCC10231 and c.a. mean 17+0.00 mm zone of inhibition against the *Cryptococcus neoformans*. From the experimental results it was clear that the drug Amphotericine B is highly effective against the selected pathogens which are showing highest resistance with high antifungal properties.

## Conclusion

Crud methanol and ethanol extract of whole plant were screened against the *Salmonella typhi* ATCC 10749 and all 21 plants and out of them 9 plant showed the ca. average range such as *Blepharis repens* (Vahl) Roth. 9+0.50 mm maximum zone of inhibition, *Crotalaria verrucosa* L. 10+0.25 mm zone of inhibition, *Enicostema axillare* (Poir. Ex Lam.) A. Raynal 10+0.25 maximum zone of inhibition gives remarkable activities ie maximum zone of inhibition. Likewise *Shigella dysenteriae* ATCC 9752 were screened against the all 21 plants and out of them 6 plants showed the ca. average range such as *Balanites aegyptica* (L.) Delile. 11+0.00 mm zone of inhibition, *Evolvulus alsinoides* (L.)L. 9+0.50 mm maximum zone of inhibition, *Aristolochia bracteolata* Lam. 16+0.07 mm ie maximum zone of inhibition. *Pseudomonas aeruginosa* ATCC9027 were screened against the all 21 plants and out of them 5 plants showed the ca. average range 7+0.00 - 8+0.25 mm Minimum zone of inhibition as mentioned in Table No. 3. *Candida albicans* ATCC10231 were screened against the all 21 plants and out of them 5 plant showed the ca. average range *such as Balanites aegyptica* (L.) Delile. 22+0.00 mm maximum zone of inhibition which was highest recorded zone of inhibition while Amphotericine B (control) gives 9+0.00 mm maximum zone of inhibition. *Cryptococcus neoformans* were also screened against the all 21 plants and two of them showed the ca. average ranges that are *Rotheca serrata* (L.) Steane & Mabb., 9+0.50 mm maximum zone of inhibition and *Balanites aegyptica* (L.) Delile, 8+0.00 i.e. maximum zone of inhibition. The above resulting observation shows that all 21 plants are enough resistant against the selected bacteria and Fungi with same plant extract and thus they are showing moderate antimicrobial properties and some needs further investigations.

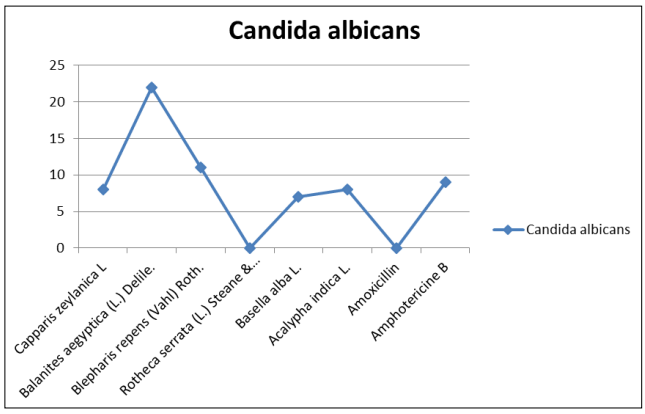



**Fig 1**

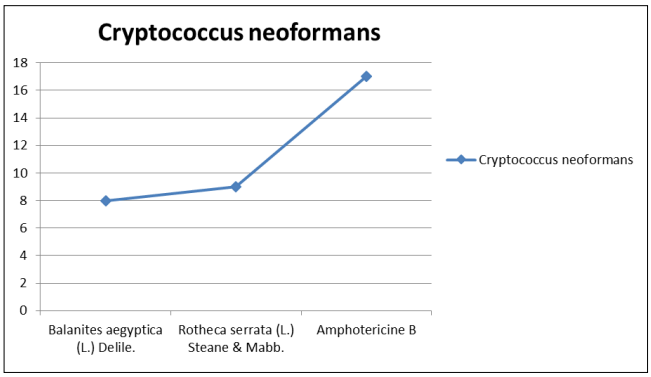
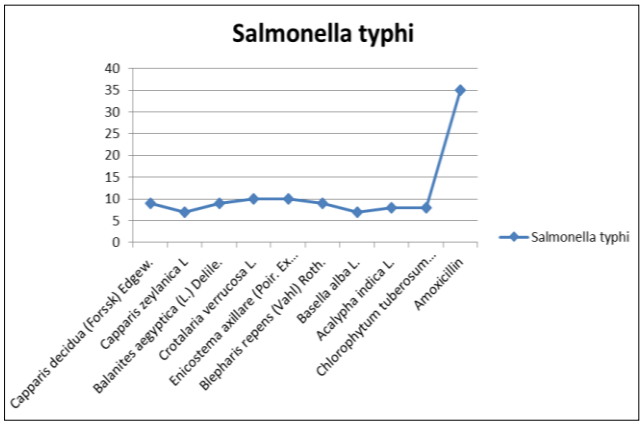



**Fig 2**

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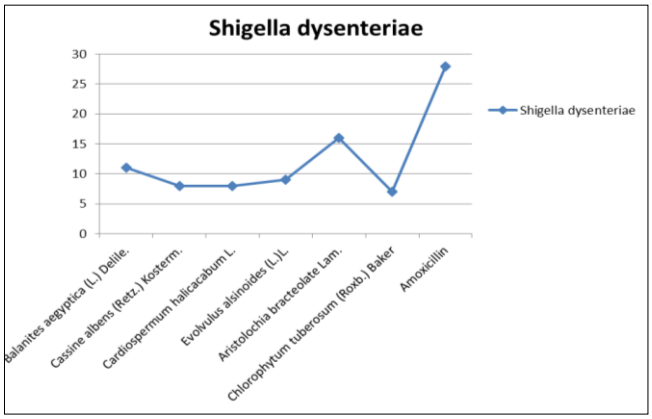


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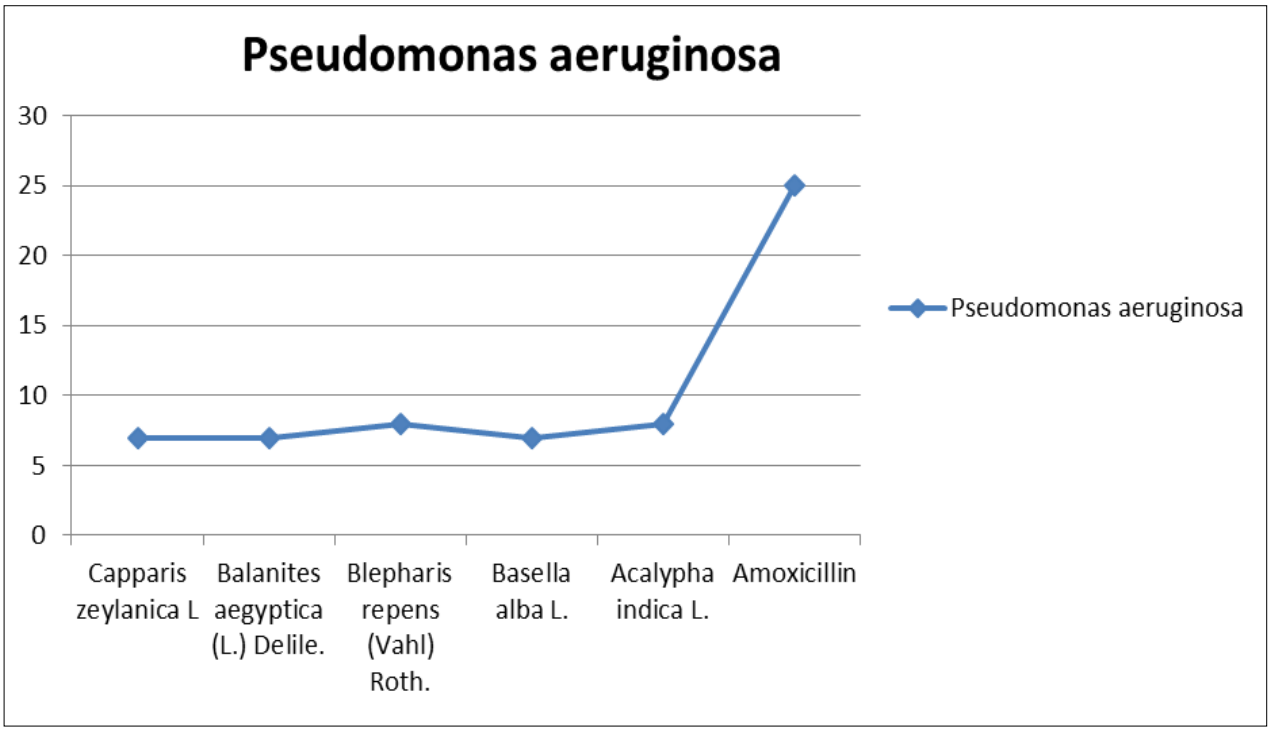


**Fig 5**

**Table 2:** Antimicrobial activity of Plant Extracts

| No | Species Name | *Salmonella typhi* | *Shigella dysenteriae* | *Pseudomonas aeruginosa* | *Candida albicans* | *Cryptococcus neoformans* |
|---|---|---|---|---|---|---|
| 1 | *Capparis decidua* (Forssk) Edgew. | 9±0.25 | No Zone | No Zone | No Zone | No Zone |
| 2 | *Capparis zeylanica* L | 7±0.00 | No Zone | 7±0.00 | 8±0.00 | No Zone |
| 3 | *Balanites aegyptica* (L.) Delile. | 9±0.00 | 11±0.00 | 7±0.00 | 22±0.00 | 8±0.00 |
| 4 | *Cassine albens* (Retz.) Kosterm. | No Zone | 8±0.00 | No Zone | No Zone | No Zone |
| 5 | *Cardiospermum halicacabum* L. | No Zone | 8±0.50 | No Zone | No Zone | No Zone |
| 6 | *Crotalaria verrucosa* L. | 10±0.25 | No Zone | No Zone | No Zone | No Zone |
| 7 | *Enicostema axillare* (Poir. Ex Lam.) A. Raynal | 10±0.25 | No Zone | No Zone | No Zone | No Zone |
| 8 | *Evolvulus alsinoides* (L.)L. | No Zone | 9±0.50 | No Zone | No Zone | No Zone |
| 9 | *Blepharis repens* (Vahl) Roth. | 9±0.50 | No Zone | 8±0.25 | 11±0.50 | No Zone |
| 10 | Rotheca serrata (L.) Steane & Mabb. | No Zone | No Zone | No Zone | No Zone | 9±0.50 |
| 11 | *Basella alba* L. | 7±0.50 | No Zone | 7±0.25 | 7±0.50 | No Zone |
| 12 | *Aristolochia bracteolate* Lam. | No Zone | 16±0.07 | No Zone | No Zone | No Zone |
| 13 | *Acalypha indica* L. | 8±0.50 | No Zone | 8±0.25 | 8±0.50 | No Zone |
| 14 | *Chlorophytum tuberosum* (Roxb.) Baker | 8±0.50 | 7±0.25 | No Zone | No Zone | No Zone |
| 22 | Amoxicillin | 35±0.00 | 28±0.00 | 25±0.00 | ----- | ----- |
| 23 | Amphotericine B | ---- | ----- | ---- | 9±0.00 | 17±0.00 |

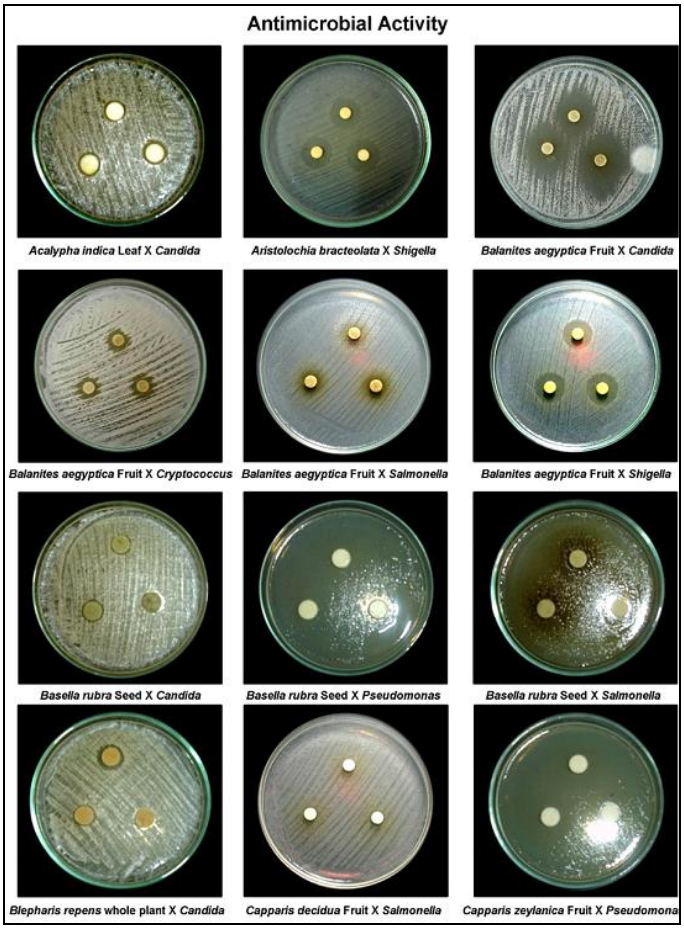
Antimicrobial Activity
Acalypha indica Leaf X Candida
Aristolochia bracteolata X Shigella
Balanites aegyptica Fruit X Candida
Balanites aegyptica Fruit X Cryptococcus
Balanites aegyptica Fruit X Salmonella
Balanites aegyptica Fruit X Shigella
Basella rubra Seed X Candida
Basella rubra Seed X Pseudomonas
Basella rubra Seed X Salmonella
Blepharis repens whole plant X Candida
Capparis decidua Fruit X Salmonella
Capparis zeylanica Fruit X Pseudomona

**Fig 6**

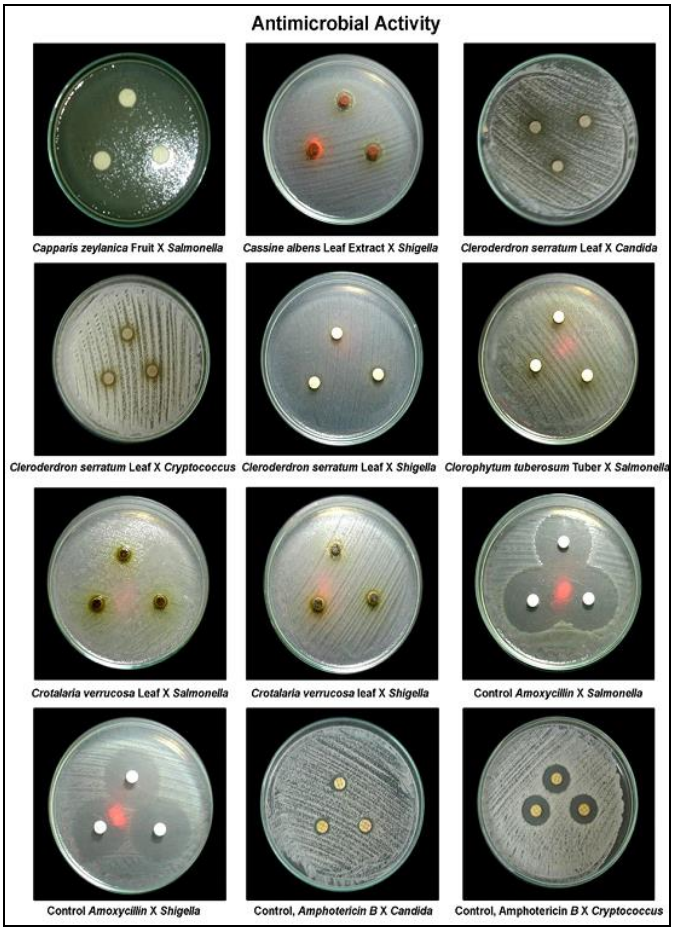
Antimicrobial Activity
Capparis zeylanica Fruit X Salmonella
Cassine albens Leaf Extract X Shigella
Cleroderdron serratum Leaf X Candida
Cleroderdron serratum Leaf X Cryptococcus
Cleroderdron serratum Leaf X Shigella
Clorophytum tuberosum Tuber X Salmonella
Crotalaria verrucosa Leaf X Salmonella
Crotalaria verrucosa leaf X Shigella
Control Amoxycillin X Salmonella
Control Amoxycillin X Shigella
Control, Amphotericin B X Candida
Control, Amphotericin B X Cryptococcus

**Fig 7**

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