



INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND DEVELOPMENT (IJPRD)

Platform for Pharmaceutical Researches & Innovative Ideas

www.ijprd.com

A COMPARATIVE ANALYSIS OF ANTIBACTERIAL PROPERTIES OF DIFFERENT VARIETIES OF *ROSA INDICA* LEAVES AND PETALS AGAINST VARIOUS PATHOGENS

Amit Pandey^{*1},
Kamlesh Kumar², Kumari Damini²

¹R&D Division, MRD LifeSciences, Lucknow-226010, India

²Sai Nath Group of Education, Agra (UP)-282007, India

ABSTRACT

The present study was designated to evaluate the antibacterial properties of ethanolic extract of leaves and petals of *Rosa indica*. Two different varieties of rose were used for this work (red and orange). The antibacterial activities of ethanolic extract against bacteria were tested by using agar well diffusion assay and the MIC values were determined by broth dilution assay. The ethanolic extract of *Rosa indica* of red and orange color showed positive result against 3 bacterial pathogens- *E. coli*, *S. aureus* and *P. aeruginosa*. The least concentrations were obtained 2.314 mg/ml for ethanolic extract of orange rose leaves against *E. coli* and 0.01 mg/ml for ethanolic extract of red rose leaves, ethanolic extract of red rose petals and ethanolic extract of orange rose petals against *P. aeruginosa*.

Key words: Antibacterial activities, ethanolic plant extract, MIC, zone of inhibition.

Correspondence to Author



Amit Pandey

R&D Division, MRD LifeSciences,
Lucknow-226010, India

Email: amit.mrdls@gmail.com

INTRODUCTION

For a long period of times plant have been valuable sources of natural products for maintaining human health, especially in the last decade with more intensive studies for natural therapies. According to World Health Organization (WHO) medicinal plants would be the best source to obtain a variety of drugs [1]. Developments of microbial resistance to the available antibiotics have led scientists to introduce the antibacterial activity of medicinal plants. The medicinal properties of plants have been investigated in the light of recent scientific

developments throughout the world, due to their potent pharmacological activities and low toxicity [2,3]. Antimicrobial activity of herbs has been known and described for several centuries [4]. Many naturally occurring compounds found in edible and medicinal plants, herbs, and spices have been shown to possess antimicrobial functions and could serve as a source of antimicrobial agents against bacteria and fungi [5,6,7]. Several studies have pointed out the possibility to use essential oils and/or their components in medical and plant pathology as well as in the food industry for the

control of microorganisms pathogenic to consumers and/or responsible for food spoilage [8]. The acceptances of traditional medicine as an alternative form of health care and the development of microbial resistance to the available antibiotics have led researchers to investigate the antimicrobial activity of medicinal plants [9,10]. Rose is a perennial plant of genus *Rosa*, within the family Rosaceae. There are over hundred species of roses, they form a group of erect shrubs and climbing plants with stems armed with sharp prickles. Flowers are large and showy and come out in many colors. Most species are native to Asia, Europe, North America and North West Africa. They are cultivated for their beauty and fragrance.

The present study is carried out by evaluation of antibacterial properties of different varieties of *Rosa indica* against various pathogens.

MATERIALS AND METHOD

Collection of plant sample:

The red and orange *Rosa indica* leaves and petals were collected from the local area in Gomti Nagar, Lucknow.

Preparation of plant extract:

An extract is a mixture of phytochemical from any plant which is obtained by extraction of specific parts of the plant. *Rosa indica* leaves and petals were washed with distilled water and kept in incubator at 37°C for 3-4 days and grinded into fine powder. Now plant material was dissolved in 70% ethanol (1:10); 1 g sample should be dissolved in 10 ml of solvent. Mixture was kept in the dark for 3 days at room temperature in sterilized beakers wrapped with aluminum foil to avoid evaporation and exposure to sunlight was avoided. After 3 days,

mixtures were filtered through Whatman no.1 filter paper and kept it in incubator at 37°C till all solvents had completely evaporated from mixtures. Now all mixtures were dissolved in Tris HCl (pH-8).

Tested microorganisms:

Bacterial cultures were obtained from IMTECH, Chandigarh. Subcultures were maintained by MRD LifeSciences, Lucknow. One gram positive culture- *Staphylococcus aureus* (MTCC 2940) and two gram negative cultures- *Pseudomonas aeruginosa* (MTCC 2453) and *E. coli* (MTCC 739) were used.

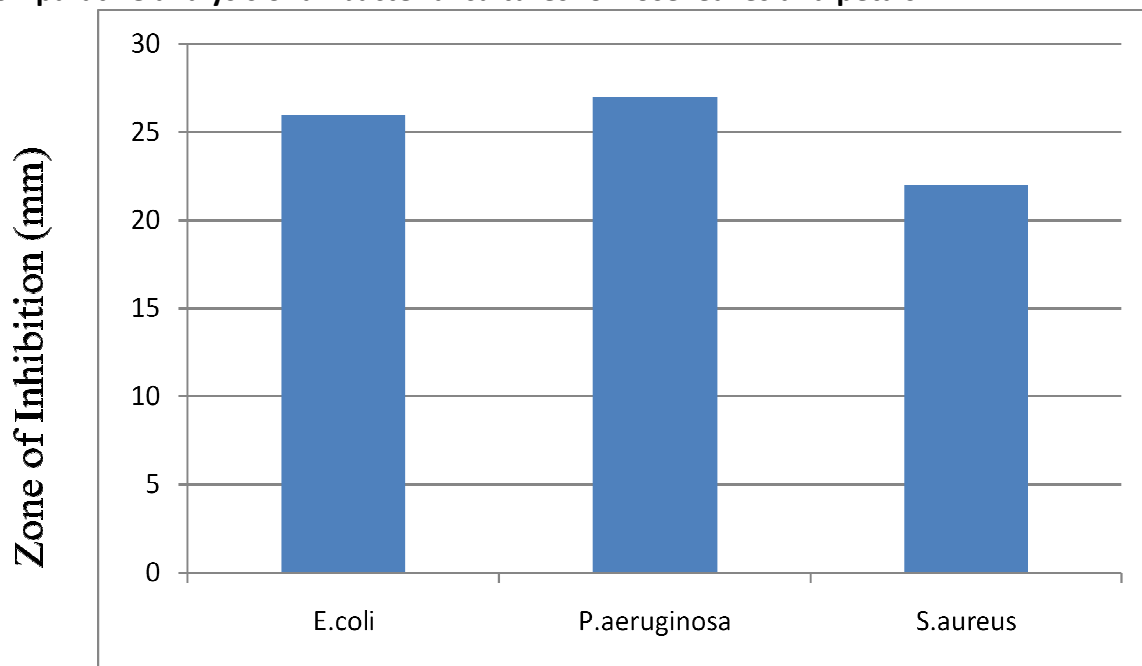
Antibiogram analysis:

The antimicrobial activity of *Rosa indica* was evaluated against bacterial strains in ethanolic, extract by using agar well diffusion method [11]. Nutrient agar plates were prepared for all extracts, 50µl inoculum of each selected bacterium was uniformly spreaded on agar plates with the help of glass spreader, after five minutes three wells approximately 5mm diameter was bored with the help of borer. The equal volume (50µl) of antibiotic (tetracycline), distilled water and plant extract were poured into the wells. The plates were incubated at 37°C for 24 hrs.

Determination of minimum inhibitory concentration (MIC) of ethanolic, methanolic, ethyl acetate and hot water extract:

The minimum inhibitory concentration (MIC) is defined as the lowest concentration of the antimicrobial agent that inhibits the visible growth of a microorganism after overnight incubation at 37°C in shaker incubator [12,13]. MIC of all samples were determined by broth dilution method. A two-fold serial dilution of the ethanolic extract was prepared and optical density was measured at 600 nm [14].

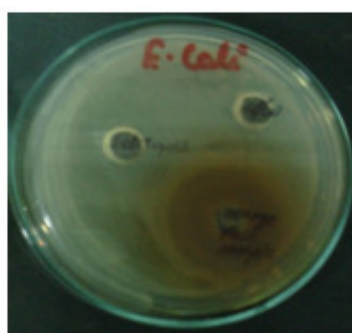
Graph 1: Comparative analysis of all bacterial cultures for rose leaves and petals:



Graph 1 showed that compare to all bacterial cultures the antibacterial activity was found to be maximum against *P. aeruginosa* followed by *E. coli* and *S. aureus*.

Table 1: Antibiogram analysis of ethanolic extract of red rose leaves

Pathogens	ZOI of Sample (mm)	ZOI of Tetracycline (mm)
<i>E. coli</i>	26	20
<i>P. aeruginosa</i>	24	27
<i>S. aureus</i>	19	29



E. coli



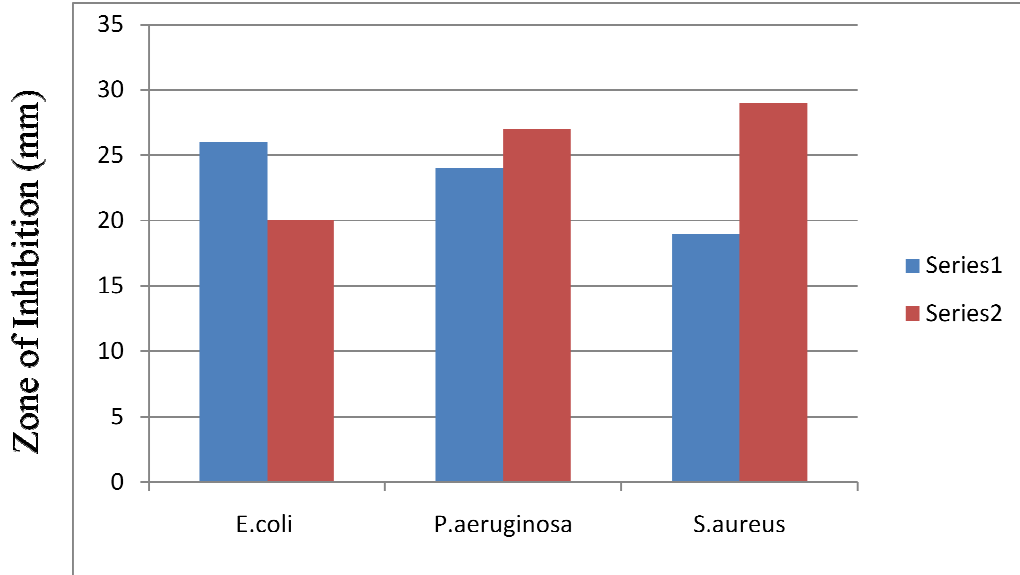
P. aeruginosa



S. aureus

Figure 1: Antibiogram analysis of ethanolic extract of red rose leaves

Graph 2: Antibiogram analysis of ethanolic extract of red rose leaves

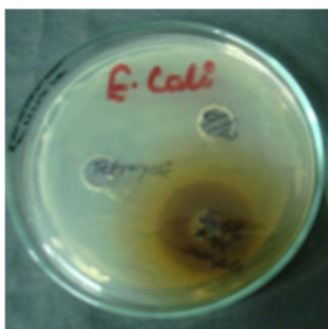


Series1 = Sample, Series 2= Tetracycline

Table 1, figure 1 and graph 2 showed that the maximum antibacterial properties were found to be highest against *E. coli*.

Table 2: Antibiogram analysis of ethanolic extract of red rose petals

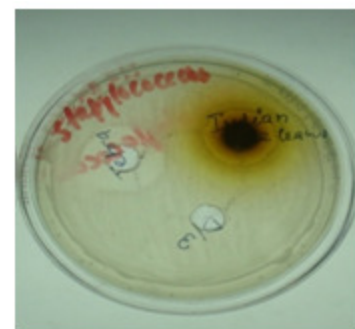
Pathogens	ZOI of Sample (mm)	ZOI of Tetracycline (mm)
<i>E. coli</i>	23	19
<i>P. aeruginosa</i>	27	28
<i>S. aureus</i>	22	24



E. coli



P. aeruginosa



S. aureus

Figure2: Antibiogram analysis of ethanolic extract of red rose petals

Graph 3: Antibiogram analysis of ethanolic extract of red rose petals

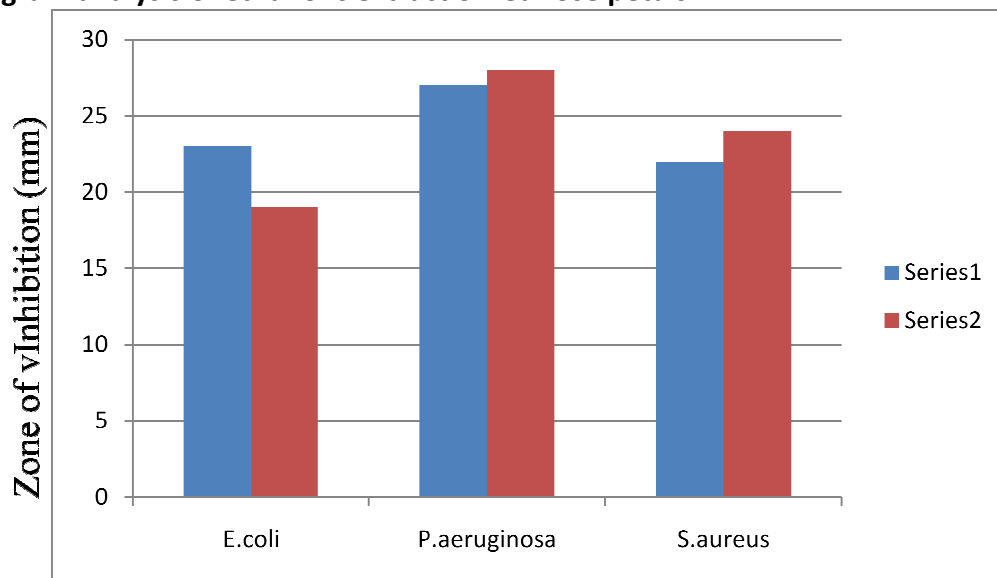


Table 2, figure 2 and graph 3 showed that the antibacterial properties were found to be maximum against *P. aeruginosa*.

Table 3: Antibiogram analysis of ethanolic extract of orange rose leaves

Pathogens	ZOI of Sample (mm)	ZOI of Tetracycline (mm)
<i>E. coli</i>	21	20
<i>P. aeruginosa</i>	27	23
<i>S. aureus</i>	22	22



E. coli

P. aeruginosa

S. aureus

Figure 3: Antibiogram analysis of ethanolic extract of orange rose leaves

Graph 4: Antibiogram analysis of ethanolic extract of orange rose leaves

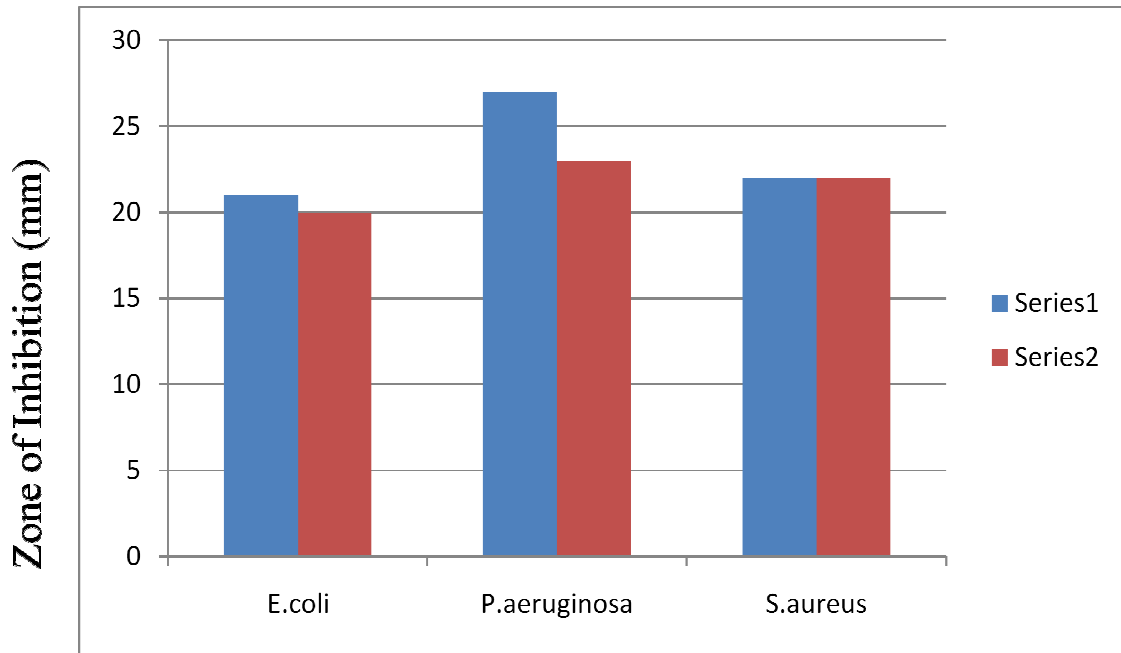
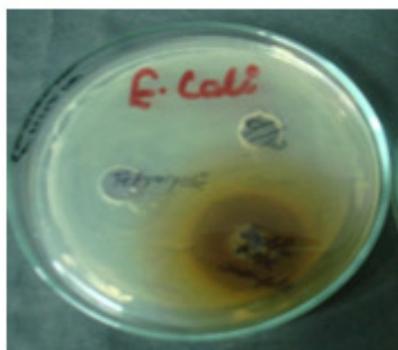


Table 3, figure 3 and graph 4 showed that the antibacterial properties were found to be maximum against *P. aeruginosa*.

Table 4: Antibiogram analysis of orange rose petals

Pathogens	ZOI of Sample (mm)	ZOI of Tetracycline (mm)
<i>E. coli</i>	18	17
<i>P. aeruginosa</i>	22	25
<i>S. aureus</i>	19	21



E. coli



P. aeruginosa



S. aureus

Figure 4: Antibiogram analysis of orange rose petals

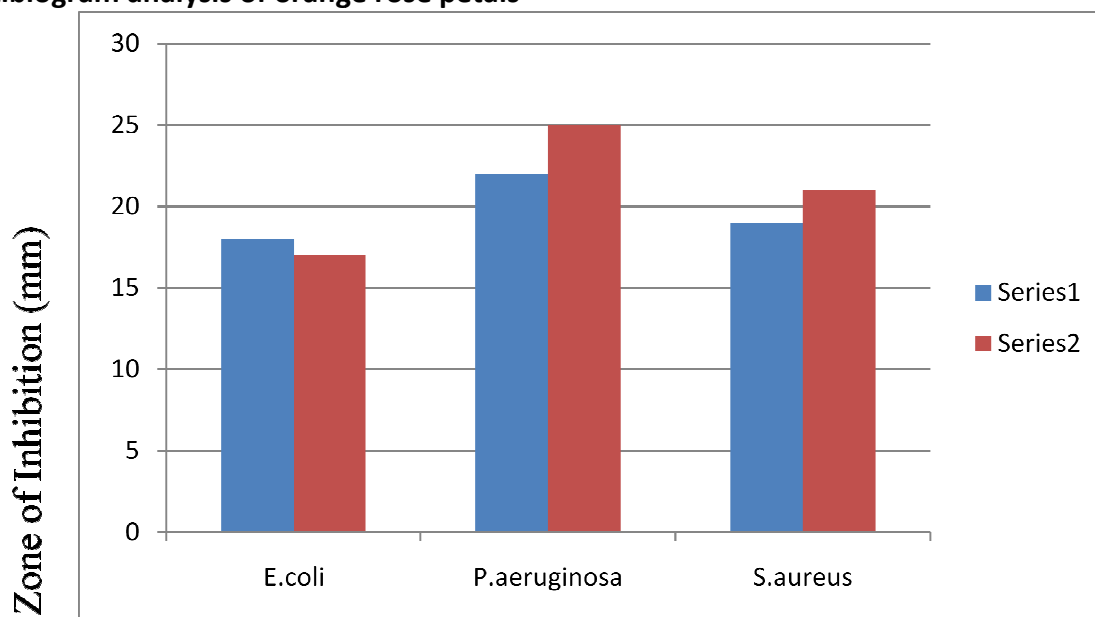
Graph 5: Antibiogram analysis of orange rose petals

Table 4, figure 4 and graph 5 showed that the antibacterial properties were found to be maximum against *P. aeruginosa*.

Table 5: MIC Result

Test tube	Concentration of plant extract (mg/ml)	Ethanollic extract of red rose leaves (OD at 600 nm against <i>E. coli</i>)	Ethanollic extract of red rose petals (OD at 600 nm against <i>P. aeruginosa</i>)	Ethanollic extract of orange rose leaves(OD at 600 nm against <i>P. aeruginosa</i>)	Ethanollic extract of orange rose petals (OD at 600 nm against <i>P. aeruginosa</i>)
1	83.33	0.03	0.00	0.00	0.00
2	13.89	0.75	0.38	0.53	0.38
3	2.314	0.45	0.54	0.26	0.54
4	0.3858	0.41	0.46	0.38	0.46
5	0.064300	0.32	0.36	0.34	0.36
6	0.01071	0.31	0.21	0.45	0.32

Table 5 showed that the least concentrations were obtained 2.314 mg/ml for ethanolic extract of orange rose leaves against *E.coli* and 0.01 mg/ml for ethanolic extract of red rose leaves, ethanolic extract of red rose petals and ethanolic extract of orange rose petals against *P. aeruginosa*.

DISCUSSION

The extraction of biologically active compounds from the plant material depends on the type of solvent used in the extraction procedure. The most commonly used solvents for investigations of antimicrobial activity in plants are methanol and ethanol [15,16]. Most of the antimicrobial active

compounds that have been identified were soluble in polar solvents such as methanol and ethanol instead of water [17,18].

In this present study the antibacterial activity of ethanolic extract of *Rosa indica* was evaluated against 3 bacterial pathogens (*E. coli*, *S. aureus* and *P. aeruginosa*). Two varieties of rose sample were

used; red and orange and also leaves and petals were taken as a used part of plant sample. The maximum antibacterial properties were found for all the samples against *E. coli* and *P. aeruginosa* in the form of zone of inhibition. The maximum inhibition obtained 27 mm against *P. aeruginosa* for ethanolic extract of red rose petals and orange rose leaves. The least concentrations were obtained 2.314 mg/ml for ethanolic extract of orange rose leaves against *E. coli* and 0.01 mg/ml for ethanolic extract of red rose leaves, ethanolic extract of red rose petals and ethanolic extract of orange rose petals against *P. aeruginosa*.

ACKNOWLEDGEMENT

This study was financially supported by MRD LifeSciences (P) Ltd. Lucknow, India. The authors would like to thank Mr. Manoj Verma, Director, Mr. R.P. Mishra (Research Scientist), Mr. Jahir Alam Khan (Research Scientist) & Ms. Chanda Sinha (Research Scientist), MRDLS, Lucknow, for their kind support throughout the research work.

REFERENCES

1. Santosh.F.A., Cunha .,G.M.A., Viana ,G.S.B., Rao.,V.S.N.,Manoel., AN., Silveira E.R. Antibacterial activity of essential oils from *Psidium* and *Pilocarpus* species of plants. *phytotherapy research*,**1995**,11(1),67-69.
2. Sharma HM., Hanna A. Kauffman EM., Newman HAI. Inhibition of human low-density lipoprotein oxidation in vitro by Maharishi ayurveda herbal mixtures. *Pharmacol. Biochem. Behav*, **1992**, 43: 1175–1187.
3. Vaquero MJR., Serravalle LRT., Manca de Nadra MC., Strasser de Saad AM. Antioxidant capacity and antibacterial activity of phenolic compounds from Argentinean herbs infusions, *Food Control*, **2010**, 21: 779–785.
4. Begamboula CF., Uyttendaele M., Debevere J. Antibacterial effect of spices and herbs on *Shigella sonnei* and *S. flexneri*, *J. Food Prot*, **2003**, 66: 668-674.
5. Deans SG., Ritchie GA. Antimicrobial properties of plant essential oils. *Int. J. Food Microbiol*, **1987**, 5: 165-180.
6. Janssen AM., Scheffer JJC., Svendsen A., Aynehchi YB. Composition and antimicrobial activity of the essential oil of *Ducrosiaa* *ethifolia* in Svendsen AB, Scheffer JJC (eds) *Essential Oils and Aromatic Plants*,**1985**, 213-216
7. Kim J., Marshall MR., Wei C. Antibacterial activity of some essential oil components against five food borne pathogens, *J. Agric.Food Chem*,**1995**, 43: 2839-2845.
8. Cantore PL., Shanmugaiah V., Iacobellis NS. Antibacterial activity of essential oil components and their potential use in seed disinfection, *J. Agric. Food Chem*, 2009, 57: 9454–9461.
9. Maoz M., Neeman I. Antimicrobial effects of aqueous plant extracts on the fungi *Microsporum canis* and *Trichophyton rubrum* and on three bacterial species, *Lett. Appl. Microbiol*,**1998**, 26: 61–63.
10. Hammer KA., Carson CF., Riley TV. Antimicrobial activity of essential oils and other plant extracts, *J. Appl. Microbiol*,**1999**,86: 985–990.
11. Ahmad.I. and Beg A.J. Antimicrobial and phytochemical studies on 45 Indian medicinal plants against multidrug resistant human pathogens, *J. Ethnopharmacol*, **2001**,74: 113-123.
12. Andrews. J.M. Determination of minimum inhibitory concentration. *J. Antimicrob.Chemother*.**2001**, 48:5-16.
13. Thongson.C., Davidson.P M., Mahakarrchanakul.W and Weiss.J. Antibacterial activity of ultrasound-associated solvent extracted species, *Lett. Appl. Microbiol*, **2004**, 39: 401-406.
14. Bauer.AW., Kirby.WM, Sheris JC., TurckM. Antibiotic susceptibility testing by a standardized single disc method, *Am J Clin Pathol*.**1966**;45: 149-158.
15. Bisignino G., Sanogo R., Marino A., Aquino R., D'angelo V., Germano MP., De Pasquale

- R and Pizza C. Antimicrobial activities of *Mitracarpus scaber* extract and isolated constituents. *Lett. Appl. Microbiol*, **1999**, 30: 105-108.
16. Lourens ACU., Reddy D., Baser KHC., Viljoen AM and Van Vuuren SF. In vitro biological activity and essential oil composition of four indigenous South African *Helichrysum* species. *J. Ethnopharmacol*, **2004**, 9: 253-258.
17. Cowan MM. Plant products as antimicrobial agents. *Clin. Microbiol. Rev.* **1999**, **12**: 564-582.
18. Parekh J., Karathia N., Chanda S. Screening of some traditionally used medicinal plants for potential antibacterial activity. *Ind. J. Pharm. Sci.* **2006**, 68: 832-834.
