



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL  
OF CURRENT RESEARCH

International Journal of Current Research

Vol. 16, Issue, 06, pp.28661-28663, June, 2024

DOI: <https://doi.org/10.24941/ijcr.47282.06.2024>

## RESEARCH ARTICLE

### SYNERGETIC ANTIMICROBIAL POTENTIAL OF *AGERATUM CONYZOIDES* AND *OCIMUM SANCTUM* ESSENTIAL OIL

Anchal Singh<sup>1\*</sup>, Parvinder Kaur<sup>2</sup> and Anuj Kumar Gupta<sup>2</sup>

<sup>1</sup>Ramniranjan Jhunjunwala College of Arts, Science and Commerce, Mumbai-400086, India; <sup>2</sup>Shri Jagdishprasad Jhabarmal Tibrewala University, Vidyanagari 333 001, India

#### ARTICLE INFO

##### Article History:

Received 28<sup>th</sup> March, 2024

Received in revised form

25<sup>th</sup> April, 2024

Accepted 14<sup>th</sup> May, 2024

Published online 25<sup>th</sup> June, 2024

##### Key words:

*Ageratum Conyzoides*, *Ocimum Sanctum*,  
Anti-Microbial Effect, Synergetic Effect.

\*Corresponding author: *Anchal Singh*

Copyright©2024, *Anchal Singh et al.* This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: *Anchal Singh, Parvinder Kaur and Anuj Kumar Gupta. 2024. "Synergetic Antimicrobial Potential of Ageratum conyzoides and Ocimum sanctum Essential Oil". International Journal of Current Research, 16, (06), 28661-28663.*

#### ABSTRACT

There is an increasing interest in scientific research and in industry, for medicinal and aromatic plant because of their potential application in medicine and plant disease control measures. In the present study the petroleum, chloroform, and methanol extract of *Ageratum conyzoides* showed the antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *E. coli* and *Pseudomonas* and extract of *Ocimum sanctum* also active against the *E. coli*, *S. aureus*, *B. subtilis* and *Pseudomonas* sp. While the synergetic study showed that the mixture of extract of these two species also has more antimicrobial activity against *Pseudomonas aeruginosa* and *S. aureus*. These results suggested the synergetic antimicrobial activity against tested bacterial sp. The present study claimed for further study of these two plants and their synergetic effect to treat various diseases and would be useful against infection resulting from *Pseudomonas aeruginosa* and *S. aureus* infection.

## INTRODUCTION

Medicinal and aromatic plants produce a wide variety of volatile, aliphatic, and cyclic hydrocarbons and their oxygenated isoprenoid derivatives. Mixture of these substances known as essential oil<sup>1,2</sup>. Their essential oil has been widely used since ancient times for therapeutic use and it represent a highly complex class of natural products having well defined role in the economic developments of a country<sup>3,4</sup>. Thus, the discovery of essential oil preparations that possess antimicrobial activity has been the subject of many research investigations consequence the screening of a wide variety of plant species. *Ageratum conyzoides* is a tropical source of medicinal and agricultural products. It is an erect herbaceous annual, 35-75 cm tall; stems are covered with fine white hairs, leaves are opposite. The species has great morphological variation and are highly adoptable for different ecological conditions. *Ocimum sanctum* is one of the commonly known medicinal plants also called Holy basil found throughout the India<sup>5,6</sup>. Approximately all the part of *Ocimum sanctum* (Tulsi) plant is using for medicinal purpose specially leaves, stem and seeds. *Ocimum sanctum* belong to the Lamiaceae family (mint family), is tropical much branch, annual herbs. Different part of the plant has been claimed to be a valuable preparation against several diseases. A tea prepared with the leaves of tulsi is commonly used in cough,

cold and bronchitis<sup>7,8</sup>. In earlier studies, *Ocimum sanctum* essential oil was found to possess anti-inflammatory, antipyretic, analgesic, antiarthritic and antiulcer activity while *A. conyzoides* is widely used to cure wounds; burns, rheumatism, headache, colic, and it have antidiarrhetic and antilithic activity<sup>9,10</sup>. In the present study antimicrobial activity of *A. conyzoides* and *Ocimum sanctum* has been synergistically investigated against number of microorganisms. However, the synergetic effect of these essential oil still needs to be validated for their biological activities due to the fast-increasing number of multidrug resistance microbes.

## MATERIALS AND METHODS

**Plant material and preparation of plant extracts:** The leaves of *A. conyzoides* and *Ocimum sanctum* were firstly wash with tap water followed by 0.1% HgCl<sub>2</sub> (Mercuric chloride), then leaves are washed with 70% ethanol for a short interval and then with sterile purified water separately. Process is further followed by drying in an oven at 80°C for 24 hr's and ground to coarse power of both. Accurately weighted powder of both types of leaves (500 mg) was taken in conical flask and extracted with different non-polar solvents for 15 min by sonication. Here I use petroleum ether, chloroform, and methanol solvent for extraction.

**Table 1. Antimicrobial activity of *Ageratum conyzoides* essential by Well plate method**

Plant part	Extract	Indicator Test: bacteria	Antimicrobial activity				Marginal mean
			Plant extract ( $\mu\text{g}/100\mu\text{l}$ )				
			50	100	150	200	
Leaf of <i>A. conyzoides</i>	Petroleum ether extracts	<i>S. aureus</i>	08.00	08.50	08.95	09.10	08.64
		<i>B. subtilis</i>	07.15	07.55	07.60	07.65	07.49
	Chloroform extracts	<i>S. aureus</i>	11.00	11.40	11.40	11.40	11.30
	Methanol extracts	<i>S. aureus</i>	12.20	12.30	12.35	12.35	12.30
<i>B. subtilis</i>		11.75	11.75	11.90	12.00	11.91	
<i>E. coli</i>		10.70	10.70	10.80	11.00	10.85	
<i>P. aeruginosa</i>		12.80	12.80	12.80	13.05	12.92	

Antimicrobial activity expressed in terms of mm. diameter of clear zone produced around the well (8 mm) by 100  $\mu\text{l}$  of plant extract at 37°C for 24 hr's

**Table 2. Antimicrobial activity of *Ocimum sanctum* essential by Well plate method**

Plant part	Extract	Indicator Test: bacteria	Antimicrobial activity				Marginal Mean
			Plant extract ( $\mu\text{g}/100\mu\text{l}$ )				
			50	100	150	200	
Leaf of <i>Ocimum sanctum</i>	Petroleum ether extracts	<i>E. coli</i>	11.00	11.50	12.67	14.00	12.29
		<i>S. aureus</i>	10.00	11.00	13.00	14.00	12.00
	Chloroform extracts	<i>E. coli</i>	09.33	10.33	11.33	12.33	10.83
		<i>B. subtilis</i>	11.67	12.00	12.00	12.00	11.92
		<i>P. aeruginosa</i>	09.00	09.33	13.33	14.00	11.41
	Methanol extracts	<i>S. aureus</i>	13.33	14.00	14.00	14.44	13.94
		<i>P. aeruginosa</i>	12.53	13.00	13.83	14.00	13.34

Antimicrobial activity expressed in terms of mm. diameter of clear zone produced around the well (8 mm) by 100  $\mu\text{l}$  of plant extract at 37°C for 24 hr's

**Table 3. Synergetic antimicrobial activity of *Ageratum conyzoides* and *Ocimum sanctum* essential oil by Well plate method**

Plant part	Extract	Indicator Test: bacteria	Antimicrobial activity				Marginal mean
			Plant extract ( $\mu\text{g}/100\mu\text{l}$ )				
			50	100	150	200	
Leaf of <i>Ageratum conyzoides</i> + Leaf of <i>Ocimum sanctum</i>	Petroleum ether extracts	<i>E. coli</i>	10.66	10.75	11.33	11.50	11.06
		<i>S. aureus</i>	11.50	11.60	13.10	14.20	12.62
		<i>B. subtilis</i>	6.66	7.10	7.25	7.33	7.08
		<i>P. aeruginosa</i>	-----	-----	-----	-----	-----
	Chloroform extracts	<i>E. coli</i>	08.70	09.20	09.50	10.20	09.40
		<i>S. aureus</i>	10.66	10.90	11.00	11.10	10.92
		<i>B. subtilis</i>	11.20	11.60	11.80	11.90	11.63
		<i>P. aeruginosa</i>	8.50	08.80	09.10	09.33	08.93
	Methanol extracts	<i>E. coli</i>	10.20	10.50	10.70	10.75	10.54
		<i>S. aureus</i>	15.10	15.40	15.50	15.50	<b>15.48</b>
		<i>B. subtilis</i>	10.90	11.20	11.33	11.33	11.19
		<i>P. aeruginosa</i>	14.66	14.90	15.33	15.66	<b>15.14</b>

Antimicrobial activity expressed in terms of mm. diameter of clear zone produced around the well (8 mm) by 100  $\mu\text{l}$  of plant extract at 37°C for 24 hr's.

The different extracts were filtered through 0.45 $\mu$  whatman's filter paper in 100 ml volumetric flask and diluted with solvent upto the mark. The final solutions had the concentration of *A. conyzoides* and *Ocimum sanctum* leaves as 5 mg/ml.

**Microorganism:** The bacterial cultures used as test organism in the study are *E. coli*, *B. subtilis*, *S. aureus*, *P. aeruginosa*. These strains have been used to check the antimicrobial activity of *A. conyzoides* and *Ocimum sanctum* essential oil separately as well as synergistically.

**Well Plate Assay:** The lawn of each indicator test bacteria was made with the help of spreader on Nutrient Agar plate. Wells (8mm) were punched on the plate with the help of sterile Corkboror. Plates were incubated at 37°C for 24 hr's. After application of 100 $\mu\text{l}$  of each concentration of plant extracts of both species in the well, both plants were observed for clear zone produced around the well (8mm) at 37°C for antimicrobial activities after 24 hr's of incubation.

## RESULT AND DISCUSSION

### Antimicrobial activity of *Ageratum conyzoides* essential oil

The petroleum ether extract of *A. conyzoides* were found to have antimicrobial activity against *Staphylococcus aureus* and *Bacillus subtilis* while chloroform extract of *A. conyzoides* were active against *in vitro* development of *Staphylococcus aureus*. Methanol extract of *A. conyzoides* showed inhibitory activity against *Staphylococcus aureus*, *Bacillus subtilis*, *E. coli* and *Pseudomonas aeruginosa*.

### Antimicrobial activity of *Ocimum sanctum* essential oil:

The petroleum ether extract of *Ocimum sanctum* were found to have antimicrobial activity against *E. coli*, *Staphylococcus aureus* while chloroform extract of *Ocimum sanctum* were active against *E. coli*, *Bacillus subtilis* and *Pseudomonas aeruginosa*. Methanol extract of *Ocimum sanctum* showed inhibitory activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

**Synergetic antimicrobial activity of *Ageratum conyzoides* and *Ocimum sanctum* essential oil:** When we take both the type of leaf extract in equal ratio (1:1) and perform well plate method for analyzing synergetic antimicrobial activity of *Ageratum conyzoides* and *Ocimum sanctum*; we analyze that the petroleum ether and methanol extracts of *Ageratum conyzoides* with *Ocimum sanctum* resist the growth of *S. aureus* more strongly than alone extract. While Methanol extract of *Ageratum conyzoides* with *Ocimum sanctum* showed more inhibitory activity against *Pseudomonas aeruginosa*. It may be possible because of the formation of some other chemical compound by reacting, component of both species.

## REFERENCES

1. P. Magiatis *et al.* 2002. "Chemical Composition and in vitro Antimicrobial Activity of the Essential Oils of Three Greek Achillea Species". *Z Naturforsch C J Biosci*, 57(3-4):287-90.
2. Hassan A. Hemeg, Ihab M. Moussa *et al.* 2020. "Antimicrobial effect of different herbal plant extracts against different microbial population". *Saudi J Biol Sci.*, 2020 Dec; 27(12): 3221–3227.
3. Gurdip Singh and Sumitra Maurya 2005. "Antimicrobial, antifungal and insecticidal investigations on essential oils". *National Product Radiance*, Vol. 4(3).
4. Majumdar, D.K. *et al.* 2005. "Antimicrobial activity of *Ocimum sanctum* L. fixed oil". *Indian Journal of Experimental Biology*. Vol. 43: 835-837
5. Verma, J.K. and Joshi, A.V. 2005. "HPTLC method for the determination of ursolic acid from *Ocimum sanctum* Linn. (Tulsi) leaves and its formulations". *Indian Drugs* 42(10): 650.
6. Lin Chav Ming 1999. *Ageratum conyzoides: A Tropical Source of Medicinal and Agricultural Products*. J.Janick (ed), *ASHS press*, Alexandria.VA.
7. Farahnaz Khalighi-Sigaroodi *et al.* 2005. "Chemical Composition and Antimicrobial Activity of the Essential Oil of *Ferulaga bernardii* Tomk and M.pimen". *DARU* Volume 13, No. 3.
8. Mohinder Kaur *et al.* 2006. "Antimicrobial properties of *Heracleum candicans* Wall". *National Product Radiance*, Vol. 5(1). pp. 25-28.
9. K.Janardhanan *et al.* 2005. "Antibacterial potential of some plants used by tribals in Maruthamalai hills, Tamil Nadu". *National Product Radiance*, Vol. 4(1) Jan-Feb.
10. P. Selvamani and S. Latha. "Antimicrobial Activity of crude extracts of *Cassia alata*". *Indian Journal of Natural Product.*, 20(3), 30.

\*\*\*\*\*