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ANTIBACTERIAL ACTIVITY OF CULINARY LEAF *CORIANDRUM SATIVUM* L.

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ABSTRACT

Culinary leaves are rich source of various phytochemicals having health benefits. Higher and aromatic plants have been traditionally used in folk medicine as well as to extend the shelf life of foods, showing inhibition against bacteria, fungi and yeasts. *Coriandrum sativum* is one of the most useful essential oil-bearing species belong to the family Apiaceae. All parts of plant are edible, fresh leaves can be used for garnishing and are common ingredient in many foods like chutneys and salads. Fresh juice of coriander is extremely advantageous in curing many deficiencies related to vitamins and iron. The extracts of Coriander leaves with various solvents were tested for antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* by disc diffusion method. Among the four solvents, acetone extract of *Coriandrum sativum* showed maximum activity against the pathogen *Staphylococcus aureus* and minimum activity was showed against *E. coli* in aqueous extract.

Keywords : Culinary leaf, *Coriandrum sativum* L., Antibacterial activity.

Introduction

Higher and aromatic plants have been traditionally used in folk medicine as well as to extend the shelf life of foods, showing inhibition against bacteria, fungi and yeasts (Hulin *et al.*, 1998). *Coriander sativum* (*C. sativum*) is one of the most useful essential oil bearing species as well as medicinal plant belongs to the family umbelliferae /apiaceae. It is highly reputed ayurvedic medicinal plant commonly known as “Dhanya” in India. Plants played a critical role in maintaining human health. All parts of plants are edible, fresh leaves can be used for garnishing and are common ingredient in many foods like chutneys and salads. Fresh juice of *Coriander* is extremely advantageous in curing many deficiencies related to vitamins and iron (Shrivstava, 2017).

Materials and Methods

Systematic Position

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Superdivision	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Rosidae
Order	:	Apiales
Family	:	Apiaceae
Genus	:	<i>Coriandrum</i>
Species	:	<i>sativum</i>

Sample Collection and Solvent Extraction

The *Coriandrum sativum* plant was selected for the antibacterial study. The selected plant was cultivated in the kitchen garden. The plant was dried under shade condition

for one month and stored in sterile containers for further use. Soxhlet apparatus was used for extraction with petroleum ether, acetone, ethanol and aqueous solvents.

Antibacterial Activity

(i) Test Organisms

The test microorganisms used for antibacterial activity were *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* which were obtained from Microbial Type Culture Collection and Gene Bank (MTCC) Chandigarh. The bacterial strains were maintained on Nutrient Agar (NA).

(ii) Nutrient Broth Preparation

Pure culture from the plates were inoculated into Nutrient Agar plate and sub cultured at 37°C for 24 h. Inoculum was prepared by aseptically adding the fresh culture into 2 ml of sterile 0.145 mol/L saline tube and the cell density was adjusted to 0.5 McFarland turbidity standard to yield a bacterial suspension of 1.5×10⁸ cfu/ml. Standardized inoculum was used for Antibacterial test.

(iii) Antibacterial Test

The medium was prepared by dissolving 38 g of Mueller-Hinton Agar Medium (Hi Media) in 1000 ml of distilled water. The dissolved medium was autoclaved at 15 Lbs pressure at 121°C for 15 min (pH 7.3). The autoclaved medium was cooled, mixed well and poured in to Petri plates (25 ml/plate). The plates were swabbed with pathogenic bacterial culture viz. *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*. Finally, the sample or sample

loaded disc placed on the surface of Mueller-Hinton Agar medium. The standard drug Streptomycin 10 mcg concentration disc was used for positive control and empty sterile disc was used for negative control. The plates were kept for incubation at 37°C for 24 hours. At the end of incubation, inhibition zones were examined around the disc (including disc) and measured with transparent ruler in

millimeters and experiment was repeated triplicates (Kohner et al., 1994; Mathabe et al., 2006; Assam et al., 2010).

Result and Discussion

The result on antibacterial activity of *Corriandrum sativum* leaf using different solvent extracts were presented in table 1, Figure 1 and plate 1.

Table 1 : Antibacterial activity of *Coriandrum sativum* leaf against bacterial pathogens

No	Bacterial Pathogens	Zone of Inhibition (mm)				
		Amikacin	Petroleum ether	Acetone	Ethanol	Aqueous
1	<i>Staphylococcus aureus</i>	15.33±0.47	16.22±0.16	18.66±0.94	17.66±0.47	16.66±0.94
2	<i>Bacillus subtilis</i>	18.00±0.16	16.33±0.47	17.33±0.94	15.00±0.81	15.00±0.81
3	<i>Escherichia coli</i>	21.00±0.81	17.33±0.28	16.33±0.47	14.66±0.94	13.66±0.94
4	<i>Klebsiella pneumoniae</i>	17.00±0.40	15.00±0.81	15.33±0.47	16.33±0.94	16.33±0.47
5	<i>Pseudomonas aeruginosa</i>	19.13±0.12	16.00±0.81	16.26±0.24	15.00±0.81	15.00±0.81

Note : Each value is a mean of three data

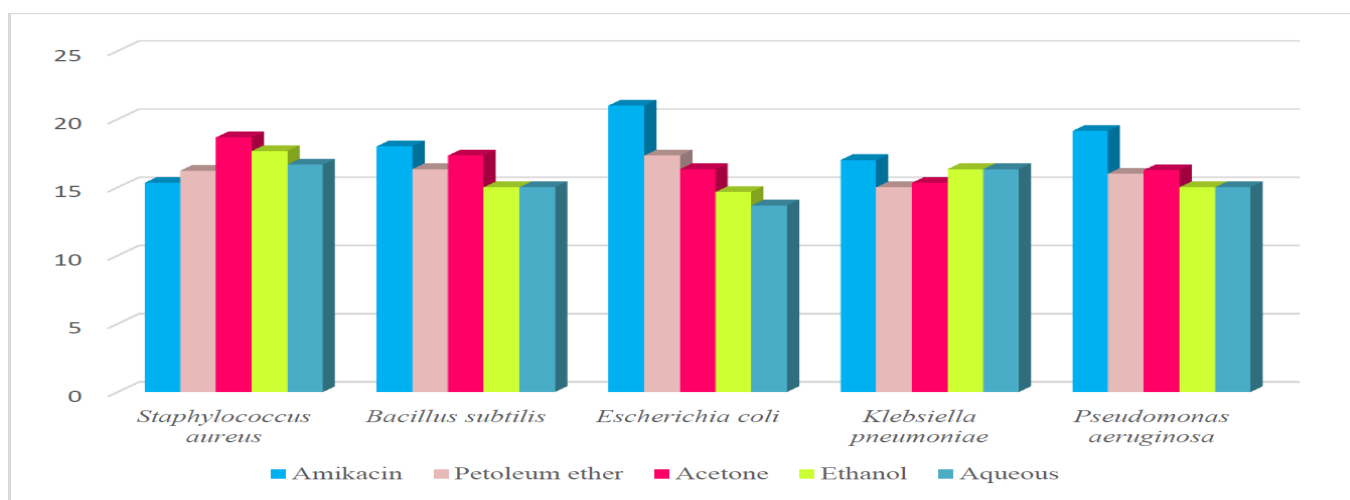


Fig. 1 : Antibacterial activity of *Coriandrum sativum* leaf against bacterial pathogens.

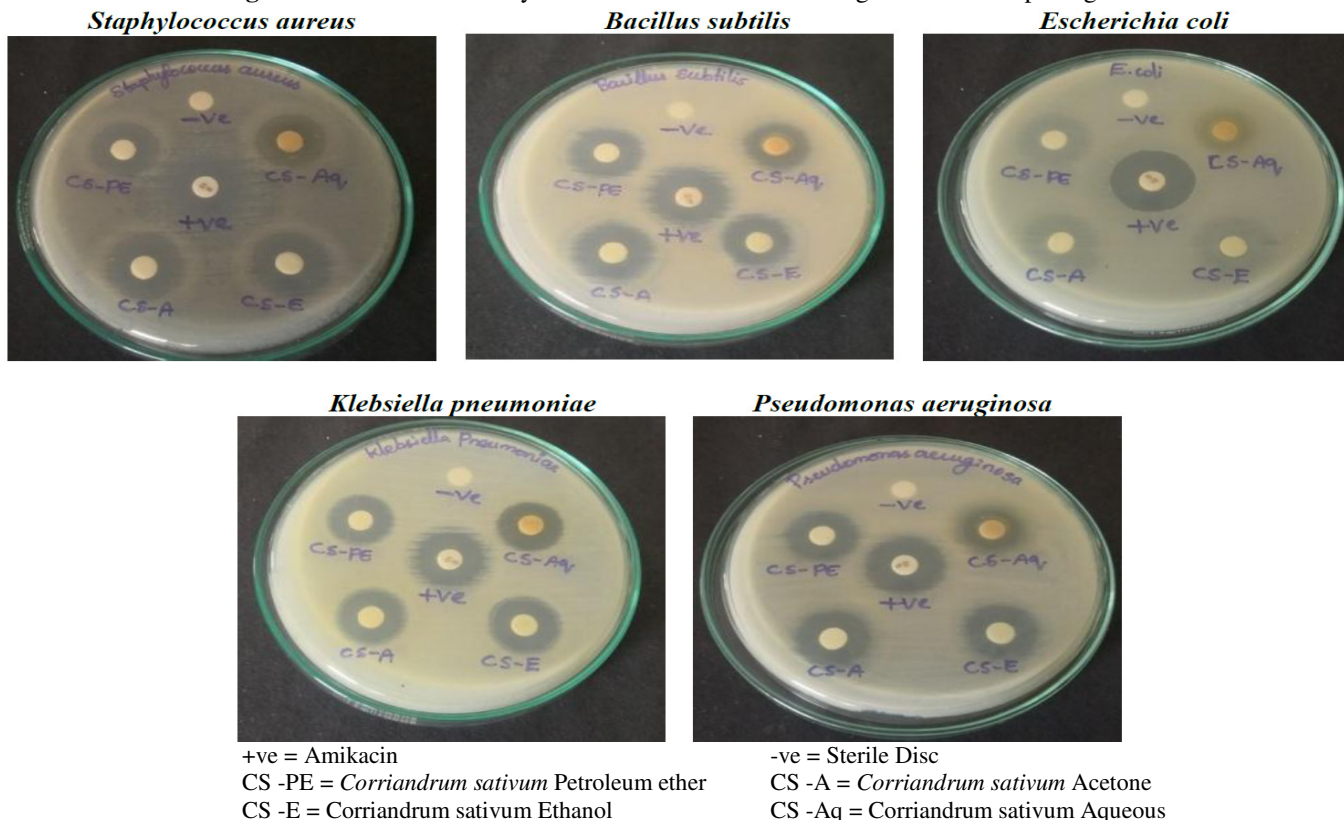


PLATE 1 : Antibacterial activity of *Coriandrum sativum* leaf against bacterial pathogens.

The petroleum ether extract showed highest zone of inhibition in *Escherichia coli* (17.33±0.28) against the other pathogens.

The acetone extract of *Coriandrum sativum* leaf showed maximum activity in *Staphylococcus aureus* (18.66±0.94) against the pathogens *Bacillus subtilis* (17.33±0.94), *E. coli* (16.33±0.47), *Pseudomonas aeruginosa* (16.26±0.24) and minimum activity was observed in *Klebsiella pneumoniae* (15.33±0.47). Ratha bai *et al.* (2012) reported the efficacy of different extracts of *Coriandrum sativum*. The methanol and acetone extracts have shown better activity against these pathogenic organisms. The acetone extract was more effective against *Staphylococcus aureus* and *Klebsiella pneumoniae*.

The ethanol extract of *Coriandrum sativum* leaf showed highest zone of inhibition in *Staphylococcus aureus* (17.66±0.47) against the pathogens *Klebsiella pneumoniae* (16.33±0.94), *Bacillus subtilis* (15.00±0.81), *Pseudomonas aeruginosa* (15.00±0.81) and *E. coli* (14.66±0.94). In aqueous extract maximum zone of inhibition was observed in *Staphylococcus aureus* (16.66±0.94) against the tested pathogens.

Acetone extract recorded the maximum zone of inhibition against *Staphylococcus aureus* and the minimum activity against *Escherichia coli* in Aqueous extract.

Conclusion

Among the four solvents, acetone extract showed the maximum number antibacterial activity and was taken for further analysis. It can be used in pharmaceutical industry as a therapeutic agent to design new drugs and it will allow researchers to go for further interesting studies.

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