

Comparative study of antimicrobial activity of *Tridax procumbens* and *Vernonia cinerea* against bacterial strains of *E. coli*, *P. putida*, *P. fluorescens* and *P. aeruginosa*.

Tanuja Murab¹, Preeti Chandurkar², Nidhi Gujar³ and Namita Ahakey⁴
Department of Biotechnology, Career College^{1,2,3,4}, Govindpura, Bhopal (M.P),^{1,2,3,4}
Email: tanujamurab16@gmail.com¹

Abstract: Food poisoning, food spoilage and infections are caused by certain microorganisms thereby harming human health on a global scale. In addition to this the multiple drug resistance of these organisms have cause a great problem. In order to circumvent these issues there is a need to find a potentially effective, cost-effective, eco-friendly agents that can be used to kill such organisms. A comparative study of plant extracts was conducted against *Pseudomonas aeruginosa*, *Pseudomonas putida*, *Pseudomonas fluorescens* and *Escherichia coli*. These four microorganisms were tested against crude, methanolic extract and acetone extract of *Tridax procumbens* and *Vernonia cinerea* using disc diffusion method and it was found that the methanolic extract of *Tridax procumbens* showed greater inhibition zones with respect to crude and acetone extract towards *Pseudomonas aeruginosa*, *Pseudomonas Putida*, *Pseudomonas fluorescens* and *Escherichia coli*. While acetone extract of *Vernonia cinerea* showed greater inhibition zone in compared to crude and methanolic extract.

Keywords-*Tridax procumbens*, *Vernonia cinerea*, plant extracts, disc-diffusion method, inhibition zones.

1. INTRODUCTION

The knowledge of ayurveda and yunani medicines have been known from centuries and have been extensively being studied in order to treat various ailments. The use of medicinal herbs is constantly used in rural areas of various underdeveloped and developing countries. For decades plants are used as source of food, housing and medicines without understanding the phyto-chemistry of the metabolites present along with their mode of action. Various parts of plants including stem, leaves, flowers, roots and plant extracts have been used to prepare concoctions to cure diseases and complications for a long time. Plants are also now being screened to study antimicrobial activities due to their defensive behaviour against insects, microorganisms and various plant eaters. The present study encompasses against the antibacterial of *Tridax procumbens* and *Veronia cinerea* [6][16] *Tridax procumbens* belongs to Asteraceae (lily) family and is a perennial green plant and is a common weed found in various parts of the world. It is known by various names ghamra, coat-buttons, herbecaille, Tridhara, kotobukigiku etc. It contains various kinds of sterols such as campesterol, B-sitosterol, stigmasterol and terpenes (B-amyrin) [2] It has been used as anti-inflammatory, anti-pyretic, anti-viral, anti-oxidant, anti-coagulant agent, prevents hair loss, aids in wound healing and

insecticidal activity. [11][16] *Vernonia cinerea* (L) also belongs to Asteraceae family is an annual herb and are known as Sahadevi. It is an annual weed also found spread throughout the world. It is known to contain triterpenes, 24-hydroxytaraxer-14-ene, b-amyrin acetate, b-amyrin benzoate and sterols like B-sitosterol, stigmasterol and a-spinasterol-a.[18] It has been known to treat various diseases like stomach ache, congestion, renal and intestine colic pain, anticancerous agent, psoriasis, leucoderma, roundworms and threadworms infestation, flatulence, dysuria, anti-smoking agent and aids in curing conjunctivitis. [12][13][9][7]

Due to these qualities these plants have been used to study their antibacterial activities against certain group of gram negative bacteria [10] that are known to cause diseases and causing food spoilage as well. *Pseudomonas aeruginosa* an opportunistic human pathogen associated with cystic fibrosis, respiratory tract infection, bacteremia, folliculitis and UTI (Urinary tract infection).[19] *Pseudomonas putida* causes thrombophlebitis, cholangitis, blood stream infections, acute cholecystitis and, tonsillitis. (SSTIs) [1] *Pseudomonas fluorescens* is also an opportunistic pathogen and causes UTI, respiratory tract infection and wound sepsis [3] *Escherichia coli* a common found in digestive tract of animals including human cause food poisoning resulting in

diarrhoea, dysentery meningitis, septicaemia, and urinary tract infections in children [14]. Our present line of work is to find out and compare antibacterial activity of plant extract namely *Tridax procumbens* and *Vernonia cinerea* on these infection causing bacteria that harm humans.

2. MATERIALS AND METHODS

The leaves of the plants were collected separately from Career College, Bhopal campus and washed properly and leaves were shade dried and extraction was done using three methods of extraction namely crude aqueous extract, methanolic extract and acetone extract of each plant namely *Tridax procumbens* and *Vernonia cinerea*

3. RESULT AND DISCUSSION

Methanolic extract of *Tridax procumbens* showed significant inhibition against all the four bacterial strains viz. against *Pseudomonas aeruginosa*, *Pseudomonas putida*, *Pseudomonas fluorescens* and *Escherichia coli* in comparison to the acetone and crude extract of the same. Acetone extract of *Vernonia cinerea* showed greater inhibition zones with respect to methanolic and crude extract for *Pseudomonas aeruginosa*, *Pseudomonas putida*, *Pseudomonas fluorescens* while methanolic extract of *Vernonia cinerea* showed greater zone of inhibition for *Escherichia coli* as compared to acetone and crude extracts.

Plant name	Bacterial strain	Zone of Inhibition in cm		
		Crude Extract 0.5mg/ml	Methanolic Extract 0.5mg/ml	Acetone Extract 0.5mg/ml
<i>Tridax procumbens</i>	<i>Pseudomonas aeruginosa</i>	1.8±0.5	2.8 ±0.5	2.0±0.55
	<i>Pseudomonas putida</i>	1.3±0.45	2.1±0.19	1.9±0.35
	<i>Pseudomonas fluorescens</i>	1.9±0.25	2.8±0.5	2.3±0.75
	<i>Escherichia coli</i>	1.0±0.55	2.6±0.15	1.8±0.20
<i>Vernonia cinerea</i>	<i>Pseudomonas aeruginosa</i>	1.4±0.5	2.4±0.5	2.7±0.55
	<i>Pseudomonas putida</i>	1.8±0.45	1.7±0.55	1.9±0.35
	<i>Pseudomonas fluorescens</i>	1.7±0.31	1.5±0.17	2.1±0.05
	<i>Escherichia coli</i>	1.2±0.55	1.9±0.15	2.5±0.18

respectively [8]. The final concentration of 0.5 mg/ml was obtained using 10% dimethyl sulphate (DMSO) solution in respective extracts. [15]

Bacterial strain used:

Bacterial strains of *Pseudomonas aeruginosa*, *Pseudomonas putida*, *Pseudomonas fluorescens* and *Escherichia coli* were made available by Department of Biotechnology, Career College, Bhopal and were preserved at 4°C on Nutrient Agar Slants.

Disc Diffusion Plate Method

Nutrient agar plates were prepared and discs of respective extracts were applied on plates that were prior inoculated with individual strains of bacteria by spread plate method. [17][5] these plates were incubated at 37 degrees Celsius for 24 hours and zone of inhibition is measured if present near the disc.[6][8][4]

Table.1. Antimicrobial screening test of Crude, Methanolic and Acetone plants extract (5 mg/ml) against some bacterial strains.

4. CONCLUSION

Upon comparative analysis of the respective extracts on microorganism it was observed that the antimicrobial activity of *Tridax procumbens* was more based on zone of inhibition with respect to *Vernonia cinerea* and can be compared in Table 1. It is also concluded that both the plant extracts are effective against the gram negative strains namely *Pseudomonas aeruginosa*, *Pseudomonas putida*, *Pseudomonas fluorescens* and *Escherichia coli*. The maximum zone of inhibition for *Pseudomonas aeruginosa* at a concentration of 0.5mg/ml was shown by *Tridax procumbens* methanolic extract 2.8 ±0.5 while in case *Vernonia cinerea* it was 2.4±0.5. It is further seen that methanolic extract are far more effective against gram negative strain in comparison to the crude and acetone extract in case of *Tridax procumbens*. Similar is the result in case of *Vernonia cinerea* except the acetone extract was far better against *Escherichia coli*.

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