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RESEARCH ARTICLE

ESTIMATION OF ANTIMICROBIAL POTENTIAL OF ECONOMICALLY IMPORTANT WEEDS AGAINST SOME SELECTED MICROBES

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ABSTRACT

The aim of the study was assess the antibacterial effect of some weed plant extracts and their synergistic antibiotic against Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa .Bacillus subtillis, Salmonella typhi. The extracts of medicinal plants were prepared using Soxhlet apparatus for alcoholic, methanolic, ethyl acetate, chloroformic extract and water reflux for aqueous extracts. The antibacterial activities of extracts were evaluated using the well diffusion method as; the inhibitory zones were recorded in millimeters. The minimal inhibitory concentration (MIC) of the plant extracts against Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa, Bacillus subtillis, Salmonella typhi. were assessed using microdilution method. The synergistic effect between plants and extraction of antibiotics was assessed using well diffusion method. The results of this study showed that methanolic and ethyl actate extracts used against S. typhi was showed antimicrobial and synergistic effect for most antibiotics better.

INTRODUCTION

Nature has been a good source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine. Various medicinal plants have been used for years in daily life to treat diseases all over the world. The uses of traditional plant extracts as well as other alternative forms of medicinal treatments have been getting momentum since the 1990s. The medicinal use of plant species outnumbered (~10%) its use as food and feed. Plant parts like fruits, tubers, flowers, leaves etc are consumed as principal or supplementary food and employed as medicines(1). According to world health organization's report about 80% of the world populations are taking interest in indigenous medicinal plants remedies. Herbal medicines have usually been used in the form of fruit and vegetables, drugs or their extract for the treatment of the diseases and for maintenance health (2). Definition: "A plant that grows so luxuriantly or plentifully that it chokes out all other plants that possess more valuable nutritive properties and they are harmful to man, animals and crops (13-16)". An antimicrobial is an agent that kills microorganisms or inhibits their growth. "Antimicrobial activity" is a general term used to refer to any compound which include antibiotics, food antimicrobial agents, sanitizers, disinfectants, and other substances that acts against microorganisms. Antibiotics, on the other hand are antimicrobial agents produced by bacteria, fungi or of synthetic in nature (3). At present, nearly 30% or more of the modern pharmacological drugs are derived directly or indirectly from plants and their extracts dominate in homeopathic or ayurvedic medicines (4).

MATERIALS AND METHODOLOGY

Plant Sample collection

The plant materials which are used for the study of antimicrobial activity are Lantana camara ,Parthenium hysterophorous, Cynodon dactylon ,Calotropis gigantea, Argemone mexicana ,Achyranthes aspera. They are collected from the areas of Agriculture College, district Rewa (M.P.)

Test Microorganism

Test Microorganism: Bacterial cultures were obtained from IMTECH, Chandigarh. Subcultures were maintained at the Botany & Biotechnology dept. of Govt. Madhav Rao Sada Shiv Rao Golwalkar College, Rewa (M.P.). Two gram positive culture- Staphylococcus aureus (MTCC 2940) and Bacillus subtillus (MTCC 6633), three gram negative cultures- Pseudomonas aeruginosa (MTCC 2453), Salmonella Typhi (MTCC 53), and E. coli (MTCC 739) were used and the three fungus cultures were used are Aspergillus niger(MTCC 2029) and Candida albicans(MTCC 183), Cladosporium cladosporioides(MTCC 3478) respectively.

Culture Media

For the study of antimicrobial activity of weed plant parts, Nutrient broth (NB), Nutrient Agar Media (NAM), Potato Dextrose Agar (PDA) were used as a growing medium for microbes.

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Table 1 showing the used solvent profile for the study

S.No.	Solvents	Formula	MW	BP(^{0}C)	MP(^{0}C)	D(g/ml)	Solubility in H_2O (g/100g)	Dielectric Constant
1.	Acetone	C_3H_6O	58.08	56.20	-94.3	0.786	Miscible	20.7(25)
2.	Methanol	C_4H_8O	88.11	77	-83.6	0.895	8.7	6 (25)
3.	Ethyl acetate	CH_4O	32.04	64.6	-98	0.791	Miscible	32.6(25)
4.	Chloroform	$CHCl_3$	119.38	61.15	-63.5	1.489	0.809	4.81(25)

Extraction Procedure

The solvents such as : Acetone, Methanol, Ethyl acetate, chloroform was added to dry pulverized leaf of each plant. The resulting suspension was allowed to stand for extraction into the Soxhlet chamber for 2-4 hr at room temperature after which it was filtered using Whatman's filter paper. The filtrate was collected as plant extract in sterile test bottles and was concentrated by evaporation (5, 8)

Antibiotics Sensitivity Test

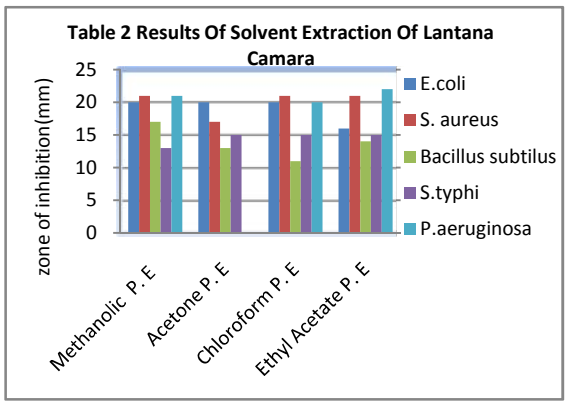
Antibiotic susceptibility testing (AST) is usually carried out to determine which antibiotic will be most successful in treating a bacterial infection in vivo. Testing for antibiotic sensitivity is often done by the Well diffusion method. In this method, we made well into the poured NAM plates into which antibiotics are placed onto a plate upon which bacteria are growing. If the bacteria are sensitive to the antibiotic, a clear ring, or zone of inhibition, is seen around the wells indicating poor growth. Other methods to test antimicrobial susceptibility include the Stokes method, E-test (also based on antibiotic diffusion). Agar and Broth dilution methods for Minimum Inhibitory Concentration determination (6, 7, 18).

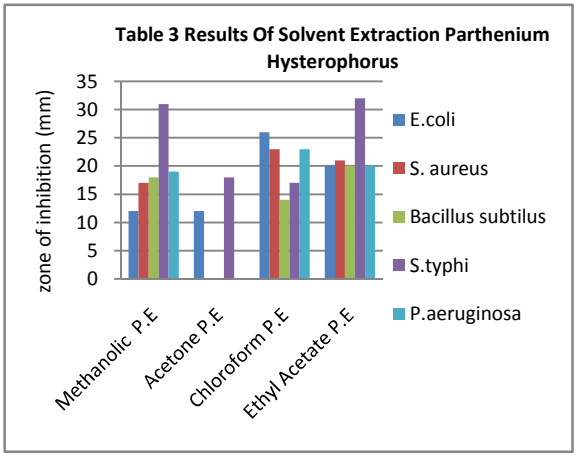
Minimum Inhibitory Concentration (Mic)

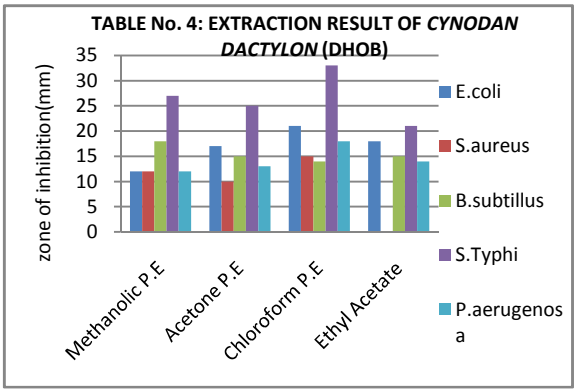
MIC is an important diagnostic laboratory test which is generally performed in microbiology. It is the lowest concentration of an antimicrobial that will inhibit the visible growth of a microorganism after overnight incubation. As much as the value of MIC will be low it will show that antimicrobial agent have better potential against microorganisms. It is the most basic laboratory measurement of the activity of an antimicrobial agent against microorganisms [B].In this study, for the MIC of all the plant extract we had used the "Tube Dilution Method" (10, 20).

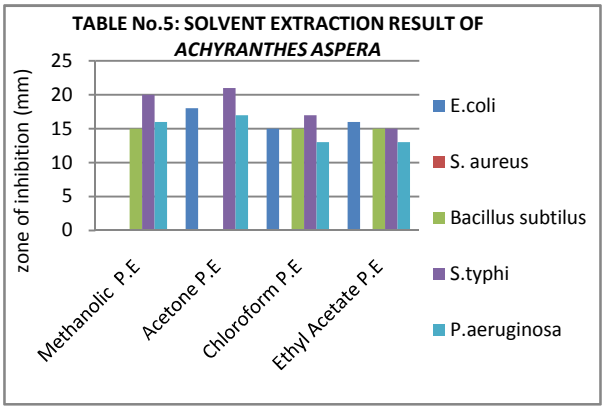
RESULTS AND DISCUSSION

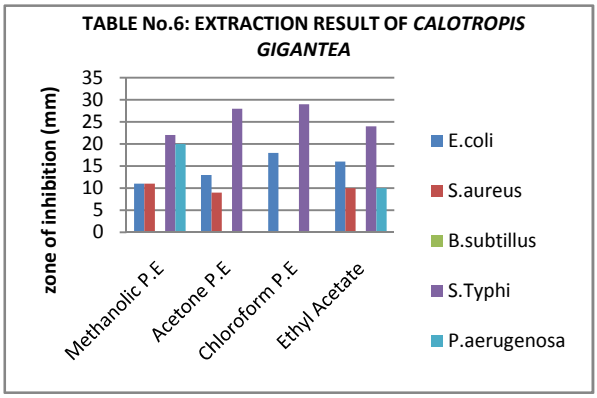
Plants, since ancient times have been utilized as a source of nutrition and healthcare products. Plants are a reservoir of diverse kinds of bioactive chemical agents and have often been utilized either in the form of traditional preparations or as pure active principles. It is reasonable to make use of locally available plants, domesticated or wild, that could substitute the synthetic preparations. The use of herbs as complementary and alternative medicine has increased dramatically in the last 20–25 years. Weeds, commonly defined as a plants that grows out of place and are competitive, persistent and pernicious3, have been a part of civilization and many ancient documents mention about humans battling weeds in the crop fields (11, 12). In our study, the plant extracts had different synergistic ability to inhibit the growth of microorganism depending on the method of extraction. Plants antimicrobials have been found to be synergistic enhancers in that though they may not have any antimicrobial properties alone, but when they are taken concurrently with standard drugs they enhance the effect of that drug (17, 19).

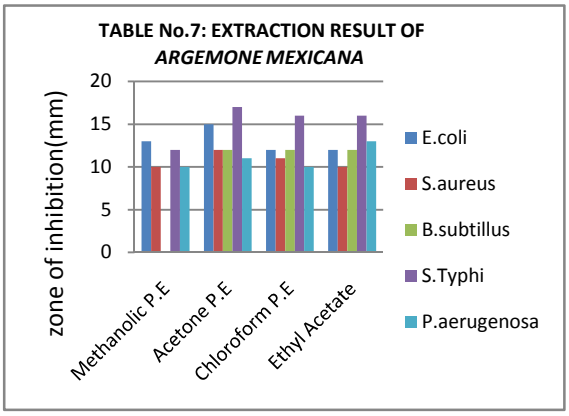












DISCUSSION

Plants, since ancient times have been utilized as a source of nutrition and healthcare products. Plants are a reservoir of diverse kinds of bioactive chemical agents and have often been utilized either in the form of traditional preparations or as pure active principles. It is reasonable to make use of locally available plants, domesticated or wild, that could substitute the synthetic preparations. The use of herbs as complementary and alternative medicine has increased dramatically in the last 20–25 years. Weeds, commonly defined as a plants that grows out of place and are competitive, persistent and pernicious3, have been a part of civilization and many ancient documents mention about humans battling weeds in the crop fields (11, 12). In our study, the plant extracts had different synergistic ability to inhibit the growth of microorganism depending on the method of extraction. Plants antimicrobials have been found to be synergistic enhancers in that though they may not have any antimicrobial properties alone, but when they are taken concurrently with standard drugs they enhance the effect of that drug (17, 19).

CONCLUSION

On the basis of the antibacterial assay of this study S. Typhi was found the more (susceptible to the employed plant extracts) than E. coli and P. Aeruginosa, S aureous, B. Subtilus. All weed plants extracts were evaluted for their antibiotic senstivty test and MIC against E. coli and P. Aeruginosa, S aureous, B. Subtilus, S. Typhi. As to thier AST results we found that, most of the weed extract shows the better results against pathogen S.typhi. As these weed plant were extracted through different extract of methanol, ethanol, ethyl acetate, chloroform. The best AST results were shown by Parthenium hysterophorus extracted by the ethyl acetate showing the zone of inhibition of 32 mm and the least result were shown by achryanthus asper into the pressence of S.aureous extracted through all the solvents. As on the basis of AST test the best zone of inhibition showing species are picked up for the MIC TEST. Most of the best mic values were shown by the cynodon dactylon and parthenium hysterophorous against S.typhi. calotropis gigentia are also showing best MIC values.

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