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Antimicrobial activity of web of spider, *Stegodyphus sarasenorum* on *E. coli* and *S. aureus.*

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ABSTRACT

Antimicrobial activity of web of spider *Stegodyphus sarasenorum* was studied on two different bacteria. Web extract prepared in three different solvents Ethanol, Methanol and Acetone. Zone of inhibition was observed for two bacteria *E. coli* and *S. aureus* after 24 hours, for all solvents. Web extractin Ethanol has shown inhibition diameter 6 mm for *E. coli* and no antimicrobial activity for *S. aureus*. Methanol extract shown zone of inhibition 12 mm for *E. coli* and 14 mm for *S. aureus*. For Acetone it was 14 mm for *E. coli* and 18 mm for *S. aureus*.

KEY WORDS: ANTIMICROBIAL ACTIVITY, WEB, *STEGODYPHUS SARASENORUM*, *E. COLI* AND *S. AUREUS*, SOLVENTS

INTRODUCTION

An antimicrobial is an agent that kills microorganisms or stops their growth. Nowadays in this ail-full life nature is being a great source as an answer for many therapeutical problems and also to treat the infection with alternative means. Many Bacterial diseases are contagious and can result in many serious and life threatening complications. *Escherichia coli* and *Salmonella* cause food poisoning. *Helicobacter pylori* causes gastritis and ulcers. *Neisseria gonorrhoea* causes sexually transmitted disease gonorrhoea. *Neisseria meningitides* causes meningitis. *Staphylococcus aureus* causes variety of infections in the body including boils, cellulitis, abscesses, wound infections, toxic shock syndrome, pneumonia and food poisoning. *Streptococcal* bacteria causes ear infections, strep throat, meningitis and many other infections.The natural world is a good source of therapeutic products that are able to inhibit the growth of bacteria. The peptides with antibacterial activity have been found in plants and the whole animal kingdom, from bacteria and different insect orders to amphibians, mammals and humans (Haeberli *et al*., 2000). Phospholipids hydrate and potassium nitrate available at spider

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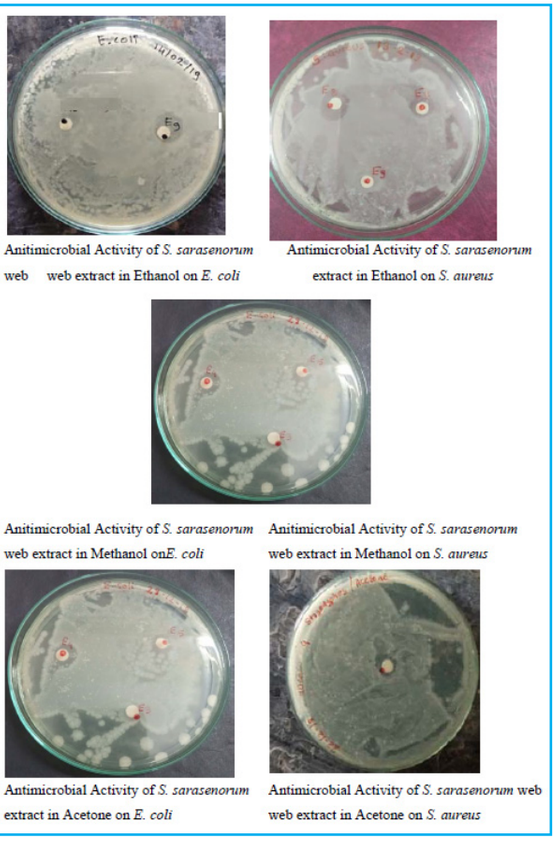

Anitimicrobial Activity of *S. sarasenorum* web web extract in Ethanol on *E. coli*

Antimicrobial Activity of *S. sarasenorum* extract in Ethanol on *S. aureus*

Anitimicrobial Activity of *S. sarasenorum* web extract in Methanol on*E. coli*

Anitimicrobial Activity of *S. sarasenorum* web extract in Methanol on *S. aureus*

Antimicrobial Activity of *S. sarasenorum* extract in Acetone on *E. coli*

Antimicrobial Activity of *S. sarasenorum* web web extract in Acetone on *S. aureus*

silk can prevent from the growth of fungi and bacteria on the silk (Chakraborthy*et al.* 2009; Gomes *et al.* 2010, WSC 2016, Deshmukh 2017).

It has been observed that there is no any microbial growth on spider's web even after it is rich source of proteins. The indication of its resistance to microorganism is its longitivity. Studies by Vollrath *et. al.* (2006) have investigated the compounds present in spider silk and have found that spider silk contains molecules that are known to have antimicrobial properties. There are many ancient examples of applications of spider silk in medicines. According to Heimer (1988) one traditional use of spider's web seen in ancient times that it was used by the peasants in Carpathian Mountains for healing wounds; they used the web of *Atypus* spider. All spiders do not spin the web, some only secrete silk to protect egg sacs or form simply drag line. Where as many spiders construct the large sized webs, there are different types of web varies according to size and shape. Orb-weaving spiders are the members of family Araneidae which spin orb webs. They have spoke like wheels with a spiral design. Cob web are the messy webs in corners especially along top of the walls. Spider belongs to family Theridiidae spin cob webs. Sheet webs are made from dense layer of silk to trap the prey. *Stegodyphus* have unkempt, irregular and large webs.

Table 1. Zone of inhibition observed for web of *Stegodyphus sarasenorum*

Solvents	Length in mm	
	E. coli	S. aureus
Ethanol	6 mm	-
Methanol	12 mm	14 mm
Acetone	14 mm	18mm

S. sarasenorum is also known as a social spider. It is native to India, Nepal, Sri Lanka and Myanmar (Karsch 1892, WSC 2016). This spider exhibits communal predation and feeding (Willey *et. al* 1993) where individual live in large cooperatively build nest or retreat constructed of silk woven using leaves, twigs and sheet webs for capturing prey (Chakraborthy *et. al.* 2009). It has been observed that in life cycle of this spider at final instar stage female devotes her life for the spiderlings to use her body fluids and then dies (Deshmukh 2017).

Spider web used in this study was of *S. sarasenorum* from family Eresidae. Webs were collected from different locations, from the places of their abundance. Spider's fresh web was collected with the help of brush and forceps. Web is kept in polythene bags of 50 micron, maintaining aseptic conditions. Bacterial cultures used were *Escherichia coli* (Gram-negative) and *Staphylococcus aureus* (Gram-positive). Bacterial cultures were collected from Department of Microbiology Bhartiya Mahavidyalaya, Amravati. Cultures were in the form of nutrient broth.

Desired bacteria *E. coli* and *S. aureus* were suspended separately in a liquid nutrient medium called Luria broth in an upright flask from which large amount of bacteria were cultured.

Spider's web was washed using distilled water and oven dried. Followed by drying web was weighed. Extract was prepared using three different solvents i.e. Ethanol, Methanol, Acetone. 1 gm. of web is dissolved in 10 ml of Ethanol, Methanol and Acetone separately for a week. Extract made was centrifuged at 4000 rpm for 30 minutes. Extracts of web in different solvents showed different colour appearance of supernatant.Agar gel was prepared. Inoculation was done in laminar airflow. Agar liquid was poured in petri plates and kept undisturbed for a while until it gets solidified into gel. Then using micropipette 5µl desired bacteria was inoculated. Spreading was done using 'L' shaped loop. A place was marked on the petri plate; a punched filter paper was deep into the extract in a cavity block and kept on the mark place.Incubation was done in incubator at 37^0 c, for 24 hours. After 24 hours petri plates were observed.

Antimicrobial activity of *S. sarasenorum* of family Eresidae was observed. Two bacterial strains were used i.e. *E. coli* and *S. aureus*. Three extracts of spider web

was prepared using three solvents Acetone, Methanol and Ethanol. Firstly these three solvents (Ethanol, Methanol, and Acetone) were tested against bacterial strains and it has been observed that there was no inhibition for growth of bacteria. Extract of web in distilled water does not show any zone of inhibition. The extracts of spider web in three solvents Acetone, Methanol and Ethanol used to study antimicrobial activity. Length of zone of inhibition is measured in mm, measured as diameter of zone with the help of paper scale.Extract of web of *S. sarasenorum* was prepared by using three solvents, Ethanol, acetone, methanol, by taking concentration 1:10. After inoculation the extracts of web of *S. sarasenorum* was placed on the inoculated plate of *E. coli* and *S. aureus* and then incubated for 24 hour.After 24 hour following results were observed: For three different solvents Ethanol, Methanol and Acetone zone of inhibition was observed for two bacteria *E. coli* and *S. aureus* gram negative and gram positive bacteria respectively. For *S. sarasenorum* Ethanol extract has shown the diameter 6 mm for *E. coli* and no inhibition for *S. aureus*. Methanol extract shown zone of inhibition was 12 mm for *E. coli* and 14 mm for *S. aureus*. For Acetone it was 14 mm for *E. coli* and 18 mm for *S. aureus*.

Findings of the work indicate that the web of *S. sarasenorum* possesses antimicrobial activity, when the extracts are prepared with Acetone, Ethanol and Methanol. Web of *Stegodyphus* resulted into maximum antimicrobial activity in Acetone for *S. aureus*. This study will be the base for further investigations on advance purification.

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