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Antimicrobial Activity of *Oxalis corniculata* Linn

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Abstract: ***Oxalis is one of the most invading plant genera; 34 species are considered invasive, and the genus ranks 15th on the list of 126 invasive plant genera , with Oxalis corniculata ranked as one of the world's worst weeds . The weed is troublesome in tropical, temperate and Mediterranean climates, including 37 countries, and has been reported to invade 30 different crops, causing yield losses in turnip, cotton, potato , soybean, apple and maize . Yield losses mainly occur when the growth of the weed coincides with the early growth of the crop. Occasionally, the yield losses are considered in significant, or the presence of O. corniculata is considered positive, i.e., when it protects the soil from erosion and competes with other weeds that are considered more harmful to the crop . The crude drug powder extracts of the leaves of the above plants were taken for the study. The antibacterial activity was performed by using gram positive and gram negative organism viz., Staphylococcus aureus and Streptococcus Sp. The antifungal activity was performed by using both Aspergillus niger and Aspergillus flavus. Antimicrobial activity was performed by agar well diffusion method. The petroleum ether solvent extracts of test material showed marked antimicrobial activity against pathogenic microorganism. The results showed that the 100% concentration of Oxalis corniculata petroleum ether extract have highest antibacterial activity and 100% petroleum ether concentration extract is effective for Aspergillus niger and 75% petroleum ether concentration extract is effective for Aspergillus flavus.***

Keywords: Antimicrobial Activity, Gram Negative Organism, Antibacterial Activity

1. Introduction

Ayurveda system of medicine use plants to cure the ailments and diseases. Despite the availability of different approaches for the discovery of therapeutically, natural products still remain as one of the best reservoir of new structural types (Cowan 1999). Medicinal plants besides therapeutic agents are also a big source of information for a wide variety of chemical constituents which could be developed as drugs with precise selectivity (Vijyalakshmi R, Ravindran R., 2012. *Oxalis corniculata* ranked as one of the world's worst weeds . The weed is troublesome in tropical, temperate and Mediterranean climates, including 37 countries, and has been reported to invade 30 different crops, causing yield losses in turnip , cotton , potato , soybean, apple and maize . Yield losses mainly occur when the growth of the weed coincides with the early growth of the crop. Different parts of *Oxalis corniculata* are known to possess various ailments by rural mainly tribal people of Chhattisgarh, India along with its use in Ayurveda, Sidha and Unani systems of medicines (A.K. Nadkarni ,1982).The plants used in the traditional system of medicine of India and china are now receiving much scientific attention. Plants produce certain chemicals which are normally toxic to bacteria (Singh , Bhatt 2003). Traditionally the powdered stem is given in rheumatic joint pain, in treatment of malaria (Gupta, 2005) and also used as an expectorant. The bark is used for the treatment of snakebite and bronchitis. Juice of the leaves is used as digestives, antidote to reptile venoms, mild bitter tonic, laxative, diaphoretic and diuretic. (Hukkeri, 2006). It has also been reported to possess hepatoprotective, anti-leishmanial, anti-viral and anti-fungal activities (Puri, 1994) and analgesic, antipyretic and ulcerogenic activities (Saxena, 1987). Although a significant number of studies have been used to obtain purified plant chemical, very few screening programmes have been initiated on crude plant materials of different medicinal plants (Pandey *et al*., 2014) (Madan Mohan *et al.,* 2014, 2015). It has also been widely observed and accepted that the medicinal value of plants lies in the bioactive phytocomponents present in the plants. The plant also possess anti-allergic (Gupta *et al.,* 1993), anti-malarial (Badam et al., 1988), antihelminthic (Lal, 1976), activities and recently reported hepatoprotective (Hukkeri Kusum *et al.,* 2006), The aim of the present study was to evaluate the susceptibility of various disease causing bacterial and fungal strains to Solvent extracts of *Oxalis corniculata* for Antimicrobial activity.

2. Material & Methods

Collection of the plant samples*:* Fresh plant parts were collected randomly from Kabirdham district of Chhattisgarh. The plants were identified and studied according to their families Fresh plant materials were collected and washed under tap water, shade dried and then homogenized to fine powder and stored in airtight bottles.

Preparation of plant extract*:* Ten grams of air dried powder was taken in 100 ml of petroleum ether in a conical flask, plugged with cotton wool and then kept on a rotary shaker at 190-220 rpm for 24 hours. After 24h, the supernatant was discarded and petroleum ether was evaporated from the powder. This dry powder was then taken in 100 ml of solvent (methanol or acetone) in a conical flask, plugged with cotton wool and then kept on a rotary shaker at 190-220 rpm for 24 h. After 24 h, the extracts were centrifuged at 5000 g for 10 min, the supernatant was collected, solvents were evaporated and the dry extract was weighed and stored at 4C in airtight bottles. The extraction was done at least three times.

Soxhlet extraction method*:* Leaves of selected plants were collected locally. Leaves were washed; air dried under shade and powdered with the help of Grinder. Powdered leaves were weighed and packed in soxhlet. Solvent used for soxhletion was petroleum ether and ethanol. Extraction was continued at the temperature of 35°C till clear solvent was observed in thimble. Extract was concentrated in water bath

at 40°C. Concentrated extract was concentrated at 40°C in hot air oven. Concentrated extract was packed in an air tight container.

Antimicrobial activity: The antimicrobial activities of different plants were evaluated by Agar well diffusion test technique.

Antimicrobial Screening Test microorganisms: Antimicrobial activity was evaluated against common pathogenic microorganisms, Gram positive bacteria- *Staphylococcus aureus* and *Streptococcus* Sp.and fungal strains *Aspergillus niger* and *Aspergillus flavus*. The bacterial cultures were grown and maintained on Nutrient Broth medium at 37ºC for 24h while the fungal culture were maintained on Potato Dextrose Agar slants and incubated at 27ºC for 48h.

Antibacterial assay: Fresh microbial culture of 0.1ml was spread on nutrient agar plate with glass spreader. A well of 6 mm diameter was punched off into agar medium with sterile cork borer and filled with 50 µg of different conc. petroleum ether extracts by using micropipette in each well in aseptic condition. The petriplates were then kept in a refrigerator to allow pre-diffusion of extract for 30 minutes and further incubated in an incubator at 37 ℃ for 24 h. The antibacterial screening was evaluated by measuring the zone of inhibition.

Antifungal assay: The antifungal activity of the leaf extracts was determined using agar well diffusion method. Small amount of diluted fungal suspension were poured over the media to spread uniformly on the surface. Later when the surface was little dried wells of 8mm were punched in the agar with stainless steel borer and filled with 300µl of plant extracts. Control wells containing neat solvents (negative control) were also run parallel in the same plate. The plates were incubated at 28°C for 72 hours and the antifungal activity was assessed by measuring the diameter of the zone of inhibition at the interval of every 24hrs.

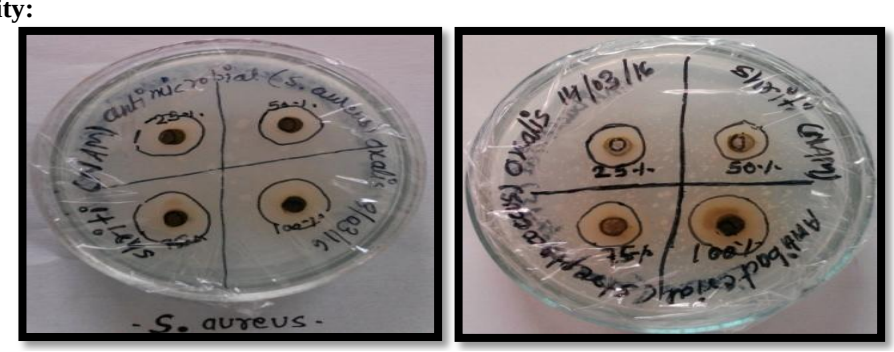
3. Result and Discussion

In the present investigation, antimicrobial efficacy of the crude extract of *Oxalis corniculata* was quantitatively assessed on the basis of inhibition zone. The most susceptible bacterium and fungi are *S. aureus* and *A.niger*, respectively. Antimicrobial activity was performed by agar well diffusion method. The petroleum ether solvent extracts of test material showed marked antimicrobial activity against pathogenic microorganism. The results showed that the 100% concentration of *Oxalis corniculata* petroleum ether extract have highest antibacterial activity and 100% petroleum ether concentration extract is effective for *Aspergillus niger* and 75% petroleum ether concentration extract is effective for *Aspergillus flavus.* antimicrobial activity shown in graph.

A. Plant Sample- *Oxalis corniculata*

Plant Sample Processing: a. Drying b. Grinding

Antibacterial activity:

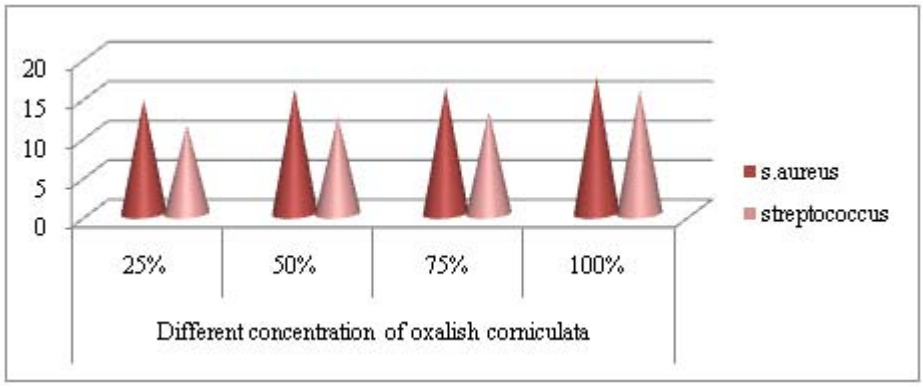


Culture- *S.aureus* Culture- *Streptococcus*

Table 1 : Antibacterial activity in *Oxalis corniculata*

No.	Plant	Organism	Different concentration

	sample		25%	50%	75%	100%
1	*Oxalis corniculata*	*S.aureus*	14.25mm	15.75mm	16.05mm	17.25mm
		Streptococcus	11.25mm	12.25mm	13mm	15.75mm



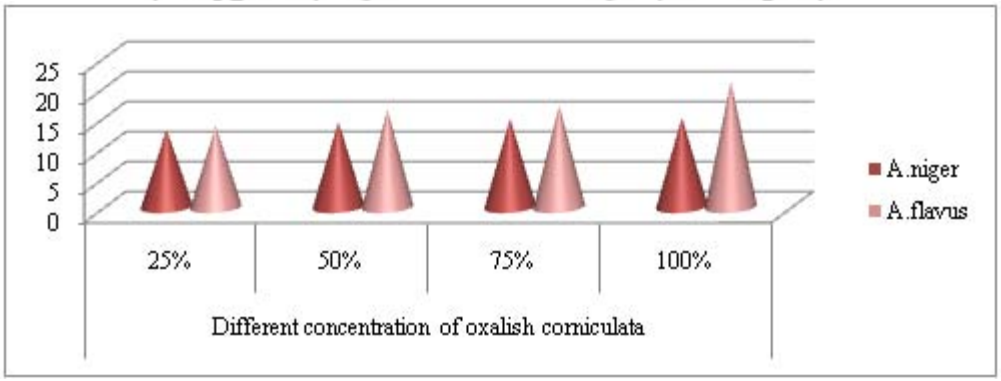
Graph 1: Antibacterial activity in *Oxalis corniculata*

B. Antifungal Activity:

Culture of *A. niger* **Culture of *A. flavus***

Table 2: Antifungal activity in *Oxalis corniculata*

Plant sample	*Organism*	*Different concentration*			
		25%	50%	75%	100%
Oxalis corniculata	*A.niger*	13mm	14.25mm	14.75mm	15mm
	A.flavus	13.5mm	16.25mm	17mm	21mm



Graph 2: Antifungal activity in *Oxalis corniculata*

4. Conclusion

Many plants were being investigated for their antimicrobial activity by many scientists of different parts world. Leaves extract of *Oxalis corniculata* with different solvents posses antimicrobial activity. From the above result it can be concluded that the leaf extract of selected plants have potential as antimicrobial compounds against microorganisms and they can be used in the treatment of infectious diseases caused by many microorganisms. By the above experimentation and result we can conclude that the selected leaf extracts were showing highest antimicrobial activity with chloroform and ethanol extract.

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