

Short Communication

Evaluation Of Antibacterial Potential Of Botanicals Against Silkworm Bacterial Pathogen (*Bacillus thuringiensis*)

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Abstract

Bacterial disease caused by *Bacillus thuringiensis* is becoming the major constrains for the mulberry silkworm (*Bombyx mori* L.) production. In the current scenario, plant based control strategies are gaining importance for management of bacterial pathogens. In order to identify the suitable plant based control strategies, different plant extracts (botanicals) were screened for their antibacterial potential against silkworm infecting bacterial pathogen. The result of the present study confirms the presence of antimicrobial substances in the plant extracts and they exhibited the inhibitory action against bacterial pathogen. Based on the results of current project study, neem extract can be used as potent antibiotic for the management of bacterial disease of silkworm.

Keywords: Botanicals, Silkworm, *B. thuringiensis*, *In vitro* evaluation.

INTRODUCTION

Bacterial pathogens are the major health concern for humans and mulberry silkworm. Hence, the

eco friendly management strategies need to be developed for bacterial pathogens. Even today plants have yield more new compounds than the chemical synthesis approach. Recent interest has shifted to the use of safer and natural botanicals to kill the pathogenic bacteria. In this regard naturally occurring medicinal plants having active constituents which show the antimicrobial activity may provide the wide area of research.

Anti-microbial of plant origin has enormous therapeutic potential. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials (Shah *et al.*, 2011). The action mechanisms of natural compounds are related to disintegration of cytoplasmic membrane, destabilization of the proton motive force (PMF), electron flow, active transport and coagulation of the cell content (Cowan, 1999). With this context, the present work was carried out to evaluate the antimicrobial potential of botanicals against important bacterial pathogens.

MATERIALS AND METHODS

Maintenance of bacterial culture.

The pre-maintained silkworm infecting pathogenic bacteria (*B. thuringiensis*) was collected from the Silkworm pathology laboratory, CSRTI, Mysore. The collected cultures were sub-cultured on nutrient agar media under a-septic condition.

Preparation of botanical extracts

Leaves (0.5g) of Mulberry (*Morus alba* L.), Hibiscus (*Hibiscus mutabilis*), Lantana (*Lantana camara*), Neem (*Azadirachta indica*) and Pongamia (*Pongamia glabra*) were collected from the garden of CSRTI, Mysore. The leaves were powdered using liquid nitrogen in a pestle and mortar. Phosphate buffer (5ml) (0.1M, pH=7.0) was used for the extraction of the antimicrobial compounds from the leaves. The homogenate was centrifuged at 10,000 rpm for 10 minutes. The supernatant was used for the antimicrobial assay whereas pellet was discarded.

Preparation of Antibiotic Disc:

Whatman filter paper disc with Diameter about 6mm was used for preparing discs. Each disc was immersed in the respective leaf extracts and lichen

extracts and placed on the surface of the pathogenic bacteria inoculated plates. These freshly prepared Discs were used for the determination of antibacterial activity.

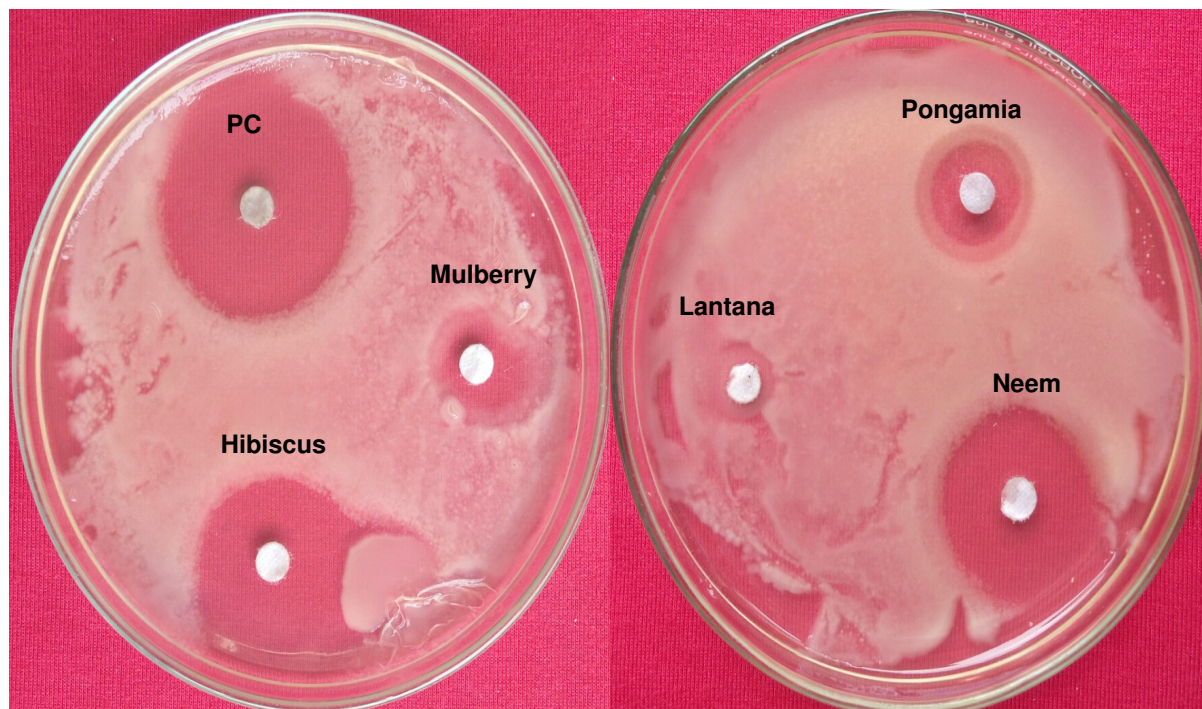


Fig. 1. Inhibition of *B. thuringiensis* by using different aqueous plant extracts.

Table 1. Estimation of antimicrobial activity against *B. thuringiensis* by using botanical extracts.

Botanicals	Replicates		
	Zone of inhibition (in Cms)		
	1	2	3
Neem	0.9	1.0	0.9
Hibiscus	0.7	0.7	0.8
Lantana	0.2	0.3	0.3
Pongamia	0.5	0.4	0.3
Mulberry	0.6	0.4	0.5
Positive Control	1.2	1.1	1.0

Determination of Antimicrobial Activity

Antimicrobial susceptibility test of the selected pathogens was done by Disc Diffusion method. All the tests were performed on nutrient agar plates. Each pathogenic bacterial suspension was prepared in sterile distilled water. Suspension of microbial Cultures was inoculated on the Surface of the nutrient agar media in a Petri plate by spread plate method Using L shaped glass rod. The sterile

discs of diameter 6mm Were immersed in the respective leaf extract solutions and placed onto the inoculated nutrient Agar plates. The experimental Nutrient Agar plates were incubated at 37°C for 24-48 hours. After incubation the plates was observed for the presence of inhibition zone around each disc. The diameter of zone of inhibition of bacteria was recorded in millimeters.

Results and discussion

Botanicals have been important source of pharmaceuticals. Even today botanicals have yield more new compounds than the chemical synthesis approach. Recent interest has shifted to the use of safer and natural botanicals to kill the pathogenic bacteria. In general plant have much greater inhibition effect against Gram-positive than Gram-negative bacteria. The activity against both types of bacteria may be indicative of the presence of broad spectrum antibiotic compounds or simply general metabolic toxins. The antimicrobial efficacy of components in plants depends on the chemical structure of active components and their concentration. There are various chemical components present in plants with antimicrobial effect including saponin, flavonoids, thiosulfonates, glucosinolates, phenolics, and organic acids. In this regard naturally occurring medicinal plants having active constituents which show the antimicrobial activity may provide the wide area of research. Antimicrobial of plant origin has enormous therapeutic potential (Cowan, 1999). The earlier work showed the inhibitory activity of the botanical extracts against different bacterial pathogens (Mohan *et al*, 2011). The botanical extracts showed inhibition of all the test bacteria used in the present study. Among the different botanicals used in the present study, neem extract showed more inhibition of *B. thuringiensis* (Fig 1 & Table 1).

The results of the present study also confirm the

presence of antimicrobial substances in the plant extracts and they exhibited the inhibitory action against bacterial pathogen. Based on the results of present study, neem extract can be used as potent antibiotic for the management of bacterial diseases of silkworm.

References

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