

**EFFICACY OF FRUITS OF *JASMINUM GRANDIFLORUM* LINN. AGAINST PLANT AND ANIMAL PATHOGENS**

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**ABSTRACT**

The phytochemical and antibacterial studies of the fruit extracts of *Jasminum grandiflorum* Linn. have been investigated. Antibacterial activity was tested using *Xanthomonas campestris* and *Aeromonas hydrophila*. The benzene, chloroform and aqueous extract were completely inactive. Methanol extract showed significant inhibitory effect against *X.campestris* and *A.hydrophila*. The phytochemical analysis revealed the presence of steroids, sugars, reducing sugars, alkaloids, phenolic compounds and tannins in the methanol extract of fruits. This study reports the methanol extracts of the fruit of the plant *J. grandiflorum* for biocontrol purposes against bacterial infection in plants and animals.

**Keywords:** Antibacterial activity, Phytochemical analysis, *Jasminum grandiflorum*.

**INTRODUCTION**

*Xanthomonas* is a very important kind of phytopathogenic bacteria, which causes the plant diseases all around the world. The hosts of this genus include at least 124 monocotyledonous and 268 dicotyledonous plants, among which the rice bacterial blight, cabbage black rot disease, and citrus blight disease are the most serious diseases, which cause a big economic impact on agricultural production every year. Chemical control has been proved efficient and economical in controlling blight disease. However, increasing public concern on environmental issues desires that alternative management systems be evolved either to reduce pesticide dependant or naturally occurring compounds be explored to constrain the pathogen attack<sup>14,6</sup>.

*Aeromonas hydrophila* is one of the causative agents for diarrhoeal infections in children and immune compromised patients. These are ubiquitous water borne organisms and have gained importance as human pathogens causing gastrointestinal and extraintestinal infections<sup>2,3,15</sup>.

*Jasminum grandiflorum* Linn. (Oleaceae) is commonly known as Jasmine. It is a well known glabrous twining shrub widely grown in gardens throughout India. Its leaves are mostly ternate or pinnate; the flowers, usually white with a tubular, five- or eight left calyx, a cylindrical corolla-tube, with a spreading limb and two stamens enclosed in the corolla-tube. The flower is acrid, bitter with a sharp taste. It is useful in treating diseases of the mouth and teeth, especially for toothache<sup>10</sup>. Flowers of *J. grandiflorum* are useful to women when used as a tonic as it aids in preventing breast cancer and stopping uterine bleeding<sup>9</sup>. The fruits of *Jasminum grandiflorum* (study material) are oval in shape, 2 cm long, green to dark purple or black when ripe. The fruits have a bitter, disagreeable flavor. Each fruit contains one spherical gray seed. The fruits of *Jasminum fluminense* Vell. (Globose, 8 mm in diameters, and dark purple or dark blue to almost black when ripe) were reported<sup>1,8,11</sup>. But no records were found to report the fruit production in *J. grandiflorum*. The present study analyses the antibacterial activity and chemical constituents of the selected fruits.

**MATERIALS AND METHODS****Extracts preparation**

Healthy, disease free fruits of *Jasminum grandiflorum* collected from Tirunelveli region were used for the preparation of aqueous and different solvent extracts. Thoroughly washed fruits were shade dried and then powdered with the help of a blender. 25 g of the powder was extracted successively with petroleum ether, benzene, chloroform, methanol and distilled water using a Soxhlet extractor for 48 h. All the extracts were concentrated and preserved in airtight bottle until further use.

**Phytochemical analysis**

Phytochemical analysis of methanol extracts of the fruits was conducted following the procedure<sup>5</sup>.

**Antibacterial assay**

The antibacterial activity assay was performed by agar disc diffusion method<sup>4</sup>. Muller Hinton agar medium was seeded with 100 $\mu$ l of inoculum ( $1 \times 10^8$  CFU/ml). The impregnated discs containing the test sample (100 $\mu$ g/ml) were placed on the agar medium seeded with tested microorganisms (*X. campestris* and *A.hydrophila*). Standard antibiotic discs (Kanamycin 30 $\mu$ g/disc, Neomycin 10 $\mu$ g/disc) and blank discs (impregnated with solvent and water) were used as positive and negative control. The plates were then incubated at 37°C for 24 h to allow maximum growth of the microorganisms<sup>4</sup>. The antibacterial activity of the test samples was determined by measuring the diameter of zone of inhibition expressed in millimeter. The assay was repeated twice and mean of the three experiments was recorded.

**Statistical analysis**

All data were expressed as mean  $\pm$  SD. Statistical analyses were evaluated by one-way ANOVA followed by Tukey HSD test. Values with  $P < 0.005$  were considered statistically significant.

**RESULT AND DISCUSSION**

Antibacterial assay of five solvent extracts of fruits of *Jasminum grandiflorum* revealed that petroleum ether and methanol extracts showed significant inhibitory effect against the tested pathogens *X. campestris* and *A.hydrophila* (Table 1). Chloroform, benzene and aqueous extracts did not show any inhibition against the tested bacteria. Methanol extract of fruits showed highly significant activity ( $p < 0.005$ ) against *X. campestris* and *A.hydrophila* respectively when compared with the positive control kanamycin and neomycin. Negative controls did not exhibit any inhibitory effect. The significant antibacterial activity of the methanol extract of fruit of selected plant may be due to their chemical constituents. Hence phytochemical analytical test was performed for the methanol extracts of the selected fruits. The phytochemical analysis revealed the presence of phenolic compounds, tannins, flavonoids in methanol extracts of the selected fruit (table 2). Phytochemical analysis of methanol extracts revealed that significant antibacterial activity is due to the presence of phenolic compounds and flavonoids.

Based on this investigation methanol extracts found to have significant antibacterial activity. Ethanol extract of flowers of *Phrygilanthus acutifolius* and this extract were bactericidal against *Staphylococcus aureus* and bacteriostatic against *Pseudomonas aeruginosa*<sup>7</sup>. The anti - phytopathogenic activity of crude and

methanol extracts of leaves, stem bark, seed and dry fruit of *Terminalia thorelli*, against four phyto pathogens<sup>13</sup>. An important characteristic of plant extracts and their components is their hydrophobicity, which enable them to partition the lipids of the bacterial cell membrane and mitochondria, disturbing the cell structures and rendering them more permeable. Extensive leakage from bacterial cells or the exit of critical molecules and ions will lead to death<sup>12</sup>. Hence this study supports the methanol extract of fruits of *Jasminum grandiflorum* may be used for treatment of bacterial infectious diseases in plants and animals.

**Table 1: Antibacterial activity of fruits of *Jasminum grandiflorum* (inhibition zone in mm)**

Extracts	<i>X. campestris</i>	<i>A. hydrophila</i>
Petroleum ether	8.66 ± 0.47	7.00 ± 0.82
Benzene	0.00 ± 0.00	0.00 ± 0.00
Chloroform	0.00 ± 0.00	0.00 ± 0.00
Methanol	18.33 ± 0.47	13.66 ± 0.47
Aqueous	0.00 ± 0.00	0.00 ± 0.00
Kanamycin(30µg/ml)	12.00 ± 0.82	11.33 ± 0.94
Neomycin(10µg/ml)	14.33 ± 0.47	10.33 ± 0.47
Blank control	0.00 ± 0.00	0.00 ± 0.00

Data given are mean of three replicates ± standard error, p < 0.005

**Table 2: Phytochemical analysis of methanol extracts of selected fruit**

Compounds	Methanol extract of fruit
Steroids	+
Triterpenoids	-
Reducing sugars	+
Sugars	+
Alkaloids	+
Phenolic compounds	+
Flavonoids	+
Catechins	-
Saponins	+
Tannins	+
Anthroquinones	-
Amino acids	-

(+) = present; (-) = absent

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