

REVIEW ON ANTIMICROBIAL ACTIVITY OF ROSY MILKWEED VINE (OXYSTELMA ESCULENTUM)

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ABSTRACT

The antimicrobial properties of *Oxystelma esculentum*, commonly known as rosy milkweed vine, have garnered significant attention due to its traditional use in folk medicine and its potential therapeutic applications. This review compiles and synthesizes current research on the antimicrobial activity of various extracts derived from *O. esculentum*, including aqueous, ethanol, and methanol extracts, against a broad spectrum of pathogenic microorganisms. Studies reveal that *O. esculentum* exhibits promising antimicrobial effects against bacteria, fungi, and viruses, attributed to its bioactive compounds, such as alkaloids, flavonoids, and saponins. The mechanisms of action, including inhibition of microbial growth, disruption of cell membranes, and interference metabolic pathways, are explored. Moreover, the review highlights the factors influencing antimicrobial efficacy, such as extraction method, concentration, and microbial resistance. The therapeutic potential of *O. esculentum* as a natural antimicrobial agent is discussed, along with its implications for the development of alternative antimicrobial therapies in the face of growing antimicrobial resistance. Finally, the review identifies gaps in current research, suggesting the need for further studies on the isolation and characterization of active compounds, as well as in vivo testing, to fully understand the medicinal value of this plant.

Keywords: Antimicrobial activity. Rosy seed, Disk diffusion.

1. INTRODUCTION

Oxystelma esculentum, commonly known as Sakal or Indian Swallowroot, is a medicinal plant native to tropical regions of Asia, particularly India [1]. This plant has a long history of use in traditional medicine for treating various ailments, such as digestive issues, fever, and inflammatory conditions. *Oxystelma esculentum* is a perennial twining herb. It grows throughout the plains, normally near water and lower hills of India Ceylon and Java This plant decoction used as a gargle in ulceration of mouth and throat [2]. In recent years, scientific interest has expanded to explore its potential antimicrobial properties, recognizing its bioactive compounds as promising sources for combating infectious diseases. The crude extract is also used to the antimicrobial activity. Most of the medicinal plants produced as a phytochemical constituent. It is also called as the secondary metabolites. That contains a chemical constituent like Cardenolides, flavonoids, phenolics, sterols and triterpenoids have been reported. It is also used as an anti-cancer activity [3]. Researchers observed the *Oxystelma esculentum* essential oils was effective against the Bacteria and Fungi. The bacteria are *Brevibacterium paucivorance*, *Enterobacter amnigeneus*, *E.coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Staphylococcus lentus* [4]. The concentration of the stem extract is inactivity against the bacteria of *Proteus mirabilis* [5]. The fungi are, *Candida spp*, *Aspergillus spp*, *Fusarium spp*, *Trichophyton spp*, *Penicillium spp*.

The review on the antimicrobial activity of *Oxystelma esculentum* aims to provide a comprehensive analysis of the plant's chemical composition and its effects against a wide range of pathogenic microorganisms, including bacteria, fungi, and viruses. Studies have identified several active compounds in *O. esculentum*, such as alkaloids, flavonoids, saponins, and glycosides, which are believed to be responsible for its antimicrobial effects. These compounds have shown promising results in laboratory studies, suggesting that the plant has the potential to serve as a natural alternative to conventional antimicrobial agents. In the context of rising concerns over antimicrobial resistance, the review explores the efficacy of *Oxystelma esculentum* in inhibiting the growth of multi-drug resistant strains of bacteria and fungi. By examining recent findings, the review highlights the mechanisms of action, such as inhibition of microbial cell wall synthesis, disruption of microbial membranes, and interference with microbial metabolism. Furthermore, it evaluates the potential applications of *O. esculentum* extracts in pharmaceuticals and food preservation.

2. TAXONOMIC DETAILS OF THE ROSY MILKWEED VINE

Kingdom	Plantae
Division	Phanerogams
Class	Dicotyledons
Order	Gentianales

Family	Apocynaceae
Genus	Oxystelma
Species	O. esculentum



Figure 1: Rosy Milkweed Vine (*Oxystelma esculentum*)

3. ANTIMICROBIAL ACTIVITY

Rosy Milkweed Vine (*Oxystelma esculentum*) has a notable antimicrobial activity due to its rich bioactive components like flavonoids, phenolic compounds, volatile terpenes, Z- ligustilide and germacrene – B that has been shown in inhibition the growth of various bacteria and fungi. Studies indicated that Rosy Milkweed Vine essential oils can be effective the pathogens like *E.coli*, *Staphylococcus aureus* and *Staphylococcus lentus* and *Candia species*. The antimicrobial activity mechanism such as break the microbial cell membranes, interface with the metabolic process and modulate the enzymatic activities.

3.1 Antibacterial activity (Disk diffusion Method):

Rosy Milkweed Vine (*Oxystelma esculentum*) is recognised for its antibacterial properties, primarily attributed to it's the bioactive components like flavonoids, phenolic compounds, volatile terpenes. And also, essential oil presents the Rosy Milkweed Vine (*Oxystelma esculentum*) such as Z- ligustilide and germacrene – B. There are lot of extraction methods are used. The ethonolic extract of stem is highly activity against the bacterial cells are *Brivibacterium paucivorance*, *Enterobacter amnigeneus*, *E.coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Staphylococcus lentus* [4]. The concentration of the stem extract is inactivity against the bacteria of *Proteus mirabilis* [5].

Mechanism of action:

The Antibacterial activity of the plant extraction that bind the cell and penetrate the cell membrane and increase the permeation. And leakage of the variety of small molecules. The bioactive compounds disrupt inhibit protein synthesis, and block enzymatic activity in pathogens and also the Biofilm disruption [6].

3.2 Antifungal activity:

Rosy Milkweed Vine (*Oxystelma esculentum*) has attention for its antifungal properties primarily due to the bioactive components like flavonoids, phenolic compounds, volatile terpenes. And also, essential oil presents the Rosy Milkweed Vine (*Oxystelma esculentum*) such as Z- ligustilide and germacrene – B. This extraction is also against the fungal species like *Candida spp*, *Aspergillus spp*, *Fusarium spp*, *Trichophyton spp*, *Penicillium spp*. Researchers observed the activity at 500 µg/ml in *Candida albicans* [7].

Mechanism of action:

Antifungal activity may be due to the biding of the sterol of fungi and form the pores or channel. Its leads the increase of permeation of the fungal cell membrane. It turns as the leakage of the variety of small molecules. Its may be induce the oxidation process and damage the fungal cells. Active compounds interfere with ergosterol in fungal cell membranes, compressing integrity and also inhibit the cell wall synthesis, metabolism, protein synthesis and DNA synthesis in the microorganisms [8].

Applications:

1. Pharmaceuticals: Its antimicrobial properties make it for a developing the alternative treatments.

2. Food Preservation: Its antibacterial properties of the rosy milkweed vine essential oils can be used in the natural preservatives for the food industries.

4. CONCLUSION

In conclusion, the review on the antimicrobial activity of *Oxystelma esculentum* (Rosy Milkweed Vine) highlights its significant potential as a source of bioactive compounds with therapeutic properties. The plant has demonstrated promising antimicrobial effects against a variety of pathogens, including bacteria, fungi, and viruses, through various in vitro studies. The bioactive compounds, such as alkaloids, flavonoids, and glycosides, contribute to its antimicrobial potency. These findings suggest that *Oxystelma esculentum* could be a valuable candidate for further exploration in the development of natural antimicrobial agents. However, more comprehensive studies, including in vivo trials and clinical investigations, are necessary to fully understand the mechanisms, efficacy, and safety of the plant's antimicrobial properties. Given the growing concern over antimicrobial resistance, the plant offers a promising avenue for discovering novel, plant-based therapies to combat infectious diseases.

5. REFERENCES

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