

## Original Research Article

# Effect of *Phyllodium Longipes* Leaf Extraction on Multi-Drug-Resistant Fungi

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**Abstract:** The aim of this study is to estimate the antifungal properties of a lesser-known plant *Phyllodium longipes*, renowned for its traditional medicinal values. Plant extract prepared using ethanol was tested against common fungal pathogens and in presence of antifungal activities the Minimum Inhibitory Concentration (MIC) was determined to study the effectiveness of the extract. The rise of multi-drug-resistant (MDR) fungal strains is causing major concerns among researchers and clinicians, as the antifungals are not very effective against MDR strains. The research will particularly focus on the plant's antifungal activity against MDR strains.

**Keywords:** Antifungal, MDR strain, *Phyllodium longipes*, Minimum Inhibitory Concentration (MIC).

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## INTRODUCTION

*Phyllodium longipes*, commonly known as “Fish Scale”, “Dragon’s Tongue”, (Fig. 1) is also called “BinuniGaach” in Bengali. It belongs to the family Fabaceae of the sub-family Faboidea (Jabbour *et al.*, 2018). These are commonly found in tropical and subtropical regions of Asia. It is cultivated in various places in India, including Kolkata and Mumbai, as well as in Kerala (the species used for this experiment was collected from Ajodhya Hill, Purulia, West Bengal). It is a small, perennial shrub that can grow up to two metres in height. The shrub bears trifoliate leaves, the terminal leaflet being significantly longer than the lateral ones; the leaves are heavily covered by brown hair, velvety, and they are prominently veined. The stem is pubescent with dense brown hair. Flowers are small and inconspicuous, white to creamy yellow, supported by two green bracts resembling a leaf, which are arranged along the pendulous blooming stalk. These are seasonally produced between August to September in native states. Fruits are small, explosive, jointed pods, each segment contains a single seed. Fruiting occurs between October to November (Anjusha *et al.*, 2022)

The leaves are considered edible by the Karen community of Thailand. The decoction made from this plant can be used to treat jaundice and aid women during the postpartum period (Limsuwan *et al.*, 2019). The bark decoction can also be employed to treat haemorrhages, diarrhoea, poisoning, and various eye disorders (Anjusha *et al.*, 2022).

Traditionally, in India, this plant has been widely used for the treatment of piles and throat cancer. Consuming leaf decoction of this shrub along with banana blossom can help reduce cancer, and direct application of the leaves on wounds can facilitate rapid recovery (Anjusha *et al.*, 2022)

## MATERIALS AND METHODS

### Plant materials –

A stalk of *Phyllodium longipes* of 10-12 cm was collected from Ajodhya hills, Purulia district, West Bengal. The stalk had ample number of leaves. It was washed, dried, pressed, and transported to the laboratory in polythene bags.



**Fig. 1:** Picture showing a twig of *P.longipes* collected from Ajodhya hill, Purulia (23.2291° N, 86.1477°E).

#### **Mueller Hinton Broth –**

4.2gm of the broth powder is taken, which is obtained from Himedia, it is mixed thoroughly with 200 mL of distilled water and autoclaved, and then the sterile media formed is stored in the laboratory.

#### **Preparation of plant extract –**

The leaves were plucked out from the stalk, and the seed buds present between the leaves were discarded. The leaves were finely chopped using a sharp blade and weighed. After weighing, 0.3mg of the sample was transferred into a centrifuge tube. 6 mL of diluent alcohol was added, followed by vortexing for 5- 6 min. The tube was left undisturbed for 48 hours. It was centrifuged at 12000 rpm for 5 min, the supernatant formed was pipetted out into a fresh tube, and double the volume (6ml) of diluent alcohol was added and again kept it undisturbed for 24hrs. All this procedure was conducted in an aseptic atmosphere.

#### **Microbial culture –**

*Candida albicans* ATCC, *Candida albicans*, *Candida parapsilosis*, *Candida auris*, were some of the fungal species isolated from diseased human sources.

## **METHODOLOGY**

Initially, the bacterial strains were cultured on their respective solid media to obtain the pure isolates. Each well of the microtiter plate was filled with 100ul of Mueller Hilton Broth (MBH), 100ul of the extract was added into the first well and mixed thoroughly, then

100ul from the first well was transferred to the next in the same horizontal row upto the last 8<sup>th</sup> well by serial dilution, this continued every alternate row making that the Test row and the adjacent one without any extract is the Control.

Subsequently, 10ul of the bacterial suspension, which was prepared in sterile normal solution according to a 0.5 McFarland standard, was added to each well of the first horizontal row. In the next adjacent row (Control), 100ul of the ethanol and 10ul of the bacterial suspension were added. Once all the wells were filled, the microtiter plate was rotated carefully to ensure even distribution of the bacteria throughout each well.

An initial reading was taken at 0 hours at 620nm to obtain the baseline optical density. A second reading was taken after 24 hours with the same wavelength. The initial baseline reading and the final reading were subtracted to study the bacterial activity interpreted by the change or growth in optical density.

## **RESULT**

The experiment demonstrated that the extract of *Phyllodium longipes* has significant antifungal activity against *C. albicans* ATCC and *C. auris*, with an MIC value less than 190ug/ml. It also has antifungal activities against *C. albicans* and *C. parapsilosis*, with an MIC value of 390ug/ml, but they are not very effective (Fig. 2 -5).

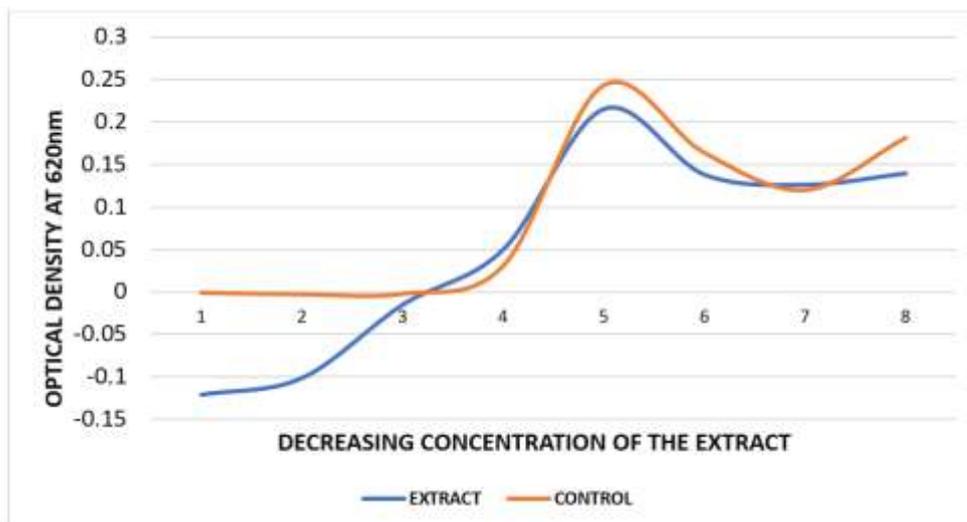


Fig. 2: Showing MIC value of extract against *Candida albicans* ATCC 14053; Concentration of extract: 1 = 25mg/ml, 2 = 12.5mg/ml, 3 = 6.25mg/ml, 4 = 3.12mg/ml, 5 = 1.56mg/ml, 6 = 0.78mg/ml, 7 = 0.39mg/ml, 8 = 0.19mg/ml. MIC value <math><190\mu\text{g/ml}</math>

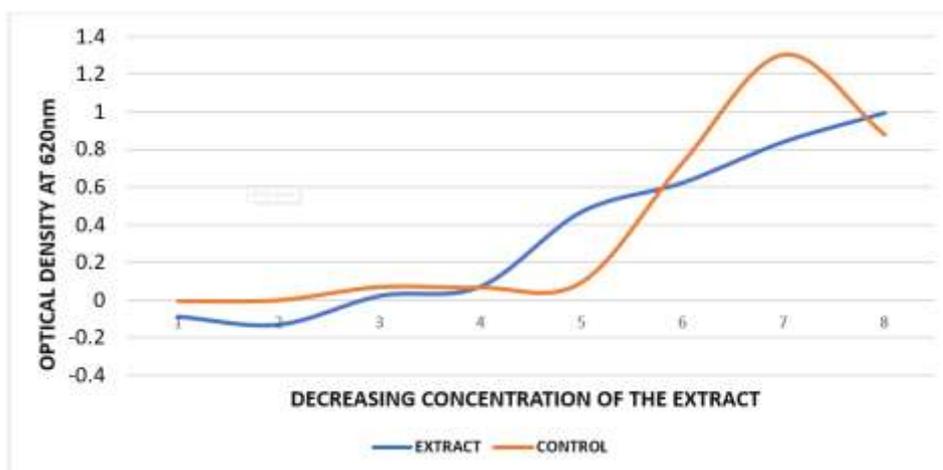


Fig. 3: showing the MIC value of extract against *Candida albicans* (wild strain); Concentration of extract: 1 = 25mg/ml, 2 = 12.5mg/ml, 3 = 6.25mg/ml, 4 = 3.12mg/ml, 5 = 1.56mg/ml, 6 = 0.78mg/ml, 7 = 0.39mg/ml, 8 = 0.19mg/ml. MIC value at  $390\mu\text{g/ml}$

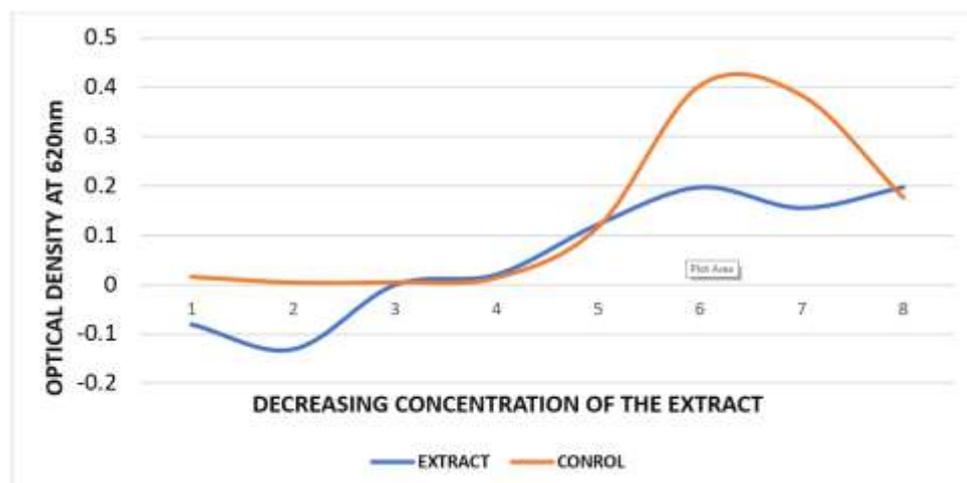
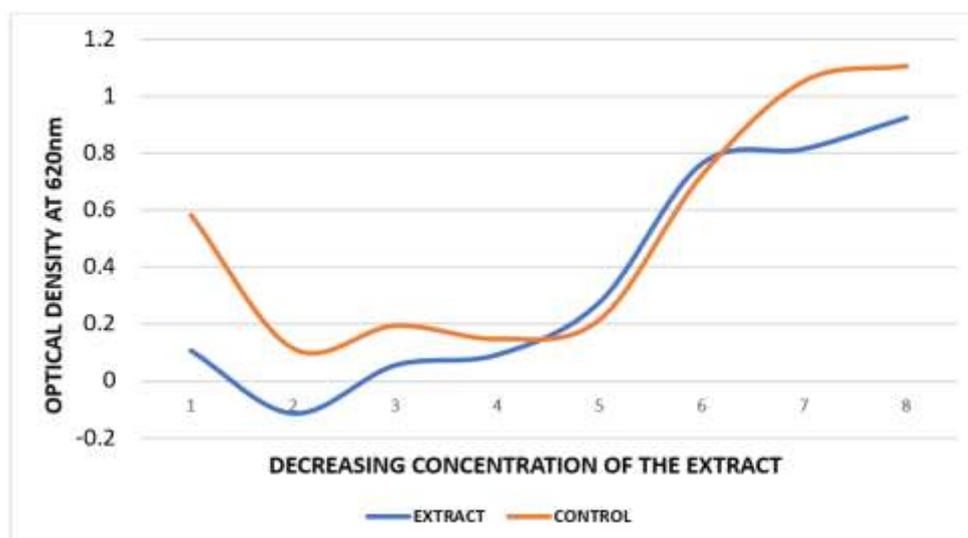


Fig. 4: Showing MIC value of extract against *Candida parapsilosis*(wild strain); Concentration of extract: 1 = 25mg/ml, 2 = 12.5mg/ml, 3 = 6.25mg/ml, 4 = 3.12mg/ml, 5 = 1.56mg/ml, 6 = 0.78mg/ml, 7 = 0.39mg/ml, 8 = 0.19mg/ml. MIC value at  $390\mu\text{g/ml}$



**Fig. 5:** Showing MIC value of extract against *Candida auris* (wild strain); Concentration of extract: 1 = 25mg/ml, 2 = 12.5mg/ml, 3 = 6.25mg/ml, 4 = 3.12mg/ml, 5 = 1.56mg/ml, 6 = 0.78mg/ml, 7 = 0.39mg/ml, 8 = 0.19mg/ml. MIC value  $< 190\mu\text{g/ml}$ .

## DISCUSSION

The result of this study showed that *Phyllodium longipes* exhibits significant antifungal activity, indicated by the low MIC value ( $< 190\mu\text{g/ml}$ ) specifically against *Candida albicans* ATCC and *Candida auris*, among which *C. auris* is a multidrug-resistant fungus and has significant clinical relevance, which showed effective sensitivity against the methanolic extract of *P. longipes*, suggesting that the phenolic compounds of the leaf extract can serve as an effective antifungal agent that can combat the emerging resistant fungal strain. These results are in correspond with the previous ethnobotanical reports of the plant, which states the medicinal use of this plant mainly for treating skin infection and inflammation (Limnuswan et al, 2019). Further research also revealed the presence of certain phytochemicals exhibiting antimicrobial activity, such as flavonoids, tannins, and terpenoids (Anjusha et al, 2022). The research targeting only the antifungal activity of the species indicates that there might be some secondary metabolites that interfere with the structure or metabolic activity of the fungi, resulting in a decrease in the fungal population. The findings also highlight the plant's ability to be used as a natural fungicide and have the potential to replace synthetic fungicides.

## CONCLUSION

The study demonstrated the antifungal activity of *Phyllodium longipes*, particularly against *Candida albicans* ATCC and *Candida auris*, with a significantly

lower MIC value, where *C. auris* is a multi-drug-resistant strain, suggesting that the plant can be used as an antifungal agent. Further research encourages the isolation and characterisation of the active phytochemicals responsible for the antifungal activity.

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## REFERENCES

- Jabbour, F., Gaudeul, M., Lambourdière, J., Ramstein, G., Hassanin, A., Labat, J.-N., & Sarthou, C. (2018). Phylogeny, biogeography and character evolution in the tribe Desmodieae (Fabaceae: Papilionoideae), with special emphasis on the New Caledonian endemic genera. *Molecular Phylogenetics and Evolution*, 118, 108–121. <https://doi.org/10.1016/j.ympev.2017.09.026>
- Limsuwan, S., Nimlamool, W., Khuntirat, B., & Srithi, K. (2019). Ethnobotanical study of the Karen in northern Thailand: Medicinal plants used in women's healthcare. *Plants*, 8(12), 600. <https://doi.org/10.3390/plants8120600>
- Anjusha, P. V., Rajagopal, P., & Athira, V. (2022, November). "Seethamudi" – An unexplored herb. *World Wide Journal of Multidisciplinary Research and Development*. E-ISSN: 2454-6615.

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