

## Antifungal efficacy of some epiphytic orchids of Karnataka, India

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**Abstract:** In this study, we determined antifungal effect of extract of four epiphytic orchids namely *Luisia zeylanica* Lindl., *Pholidota pallida* Lindl., *Dendrobium nutantiflorum* A. D. Hawkes & A. H. Heller and *Coelogyne breviscapa* Lindl. collected from different places of Western Ghats of Karnataka, India. Poisoned food technique was performed to evaluate antifungal effect of orchids against fungal isolates from plant origin. Growth (in terms of colony size) of test fungi was considerably lesser on plates poisoned with orchid extracts. Extract of *C. breviscapa* and *L. zeylanica* displayed high and least inhibitory activity against test fungi. These orchids appear to be promising sources of antifungal agents.

**Keywords:** Orchids, Antifungal, Poisoned food technique

### INTRODUCTION

Plants are susceptible to infections caused by a variety of pathogens among which fungi represent the most important and dominant group of phytopathogens because they cause a huge number of diseases. Fungal diseases of plants are responsible for poor establishment and stand loss. Synthetic fungicides are widely used for the control phytopathogenic fungi, however, their use is not so beneficial owing to high cost, emergence of resistant pathogens, residual problem and deleterious effect on non-target organisms including humans. Hence, search for alternatives for controlling phytopathogenic fungi is of immense interest. Plant extracts, their metabolites and plant based formulations are known to inhibit several fungi including phytopathogenic fungi [1-6].

Orchidaceae is one among the largest families of the flowering plants. It is a highly evolved and widely distributed family and includes a large number of terrestrial, saprophytic and epiphytic species. Orchids exhibit incredible diversity in shape, size and color of the flowers. Orchids are important aesthetically and medicinally and are economically important. Many orchid species are cultivated for ornamental purposes. Orchids are used as food and many orchids are traditionally used as medicine in many parts of the world. However, their number is declining due to high demand, indiscriminate collection and habitat destruction [7-11]. Orchid are found to exhibit bioactivities such as antimicrobial, antioxidant, anthelmintic, insecticidal, analgesic, antipyretic, wound healing and anticancer activity [12-15]. The present study was conducted to determine antifungal potential of four epiphytic orchids namely *Luisia zeylanica* Lindl., *Pholidota pallida* Lindl., *Dendrobium*

*nutantiflorum* A. D. Hawkes & A. H. Heller and *Coelogyne breviscapa* Lindl., collected from different places of Western Ghats of Karnataka, India which were shown to exhibit antibacterial and radical scavenging activity in our previous study [16].

### MATERIALS AND METHODS

#### Collection of orchids

The orchids were collected at Lakkavalli (*L. zeylanica*), Varadahalli (*P. pallida*) and Seethalayyana Giri (*D. nutantiflorum* and *C. breviscapa*) of Karnataka during January and February 2015. The orchids were authenticated by Prof. D. Rudrappa, Department of Botany, S.R.N.M.N College of Applied Sciences, Shivamogga-01.

#### Extraction

The orchids were washed, shade dried and powdered. 25g of each powder was transferred into a separate conical flasks, 100ml of ethyl alcohol was added and stirred well. The flasks were left for two days and then filtered through muslin cloth followed by Whatman No. 1 filter paper. The filtrate was evaporated to dryness in order to get the extract [17].

#### Antifungal activity of extract of selected orchids

Fungi namely *Bipolaris sorokiniana* (from root rot of wheat), *Colletotrichum capsici* (from anthracnose of chilli), *Fusarium oxysporum* f.sp. *zingiberi* (from rhizome rot of ginger) and *Curvularia* sp. (from moldy sorghum grains) were used to assess their susceptibility to orchid extracts by poisoned food technique. The test fungi were inoculated at the centre of control (without extract) and poisoned potato dextrose agar plates (1mg extract/ml of medium) by point inoculation method using sterile inoculation needle. The plates were left for

5 days at room temperature. Later, the diameter of colonies in control and poisoned plates was measured in mutual perpendicular directions. Antifungal activity, in terms of inhibition of mycelial growth of test fungi, of extract of selected orchids was determined using the formula:

$$\text{Inhibition of mycelial growth (\%)} = (C - T / C) \times 100,$$

Where,

C and T refers to colony diameter of test fungi on control and poisoned plates respectively [6].

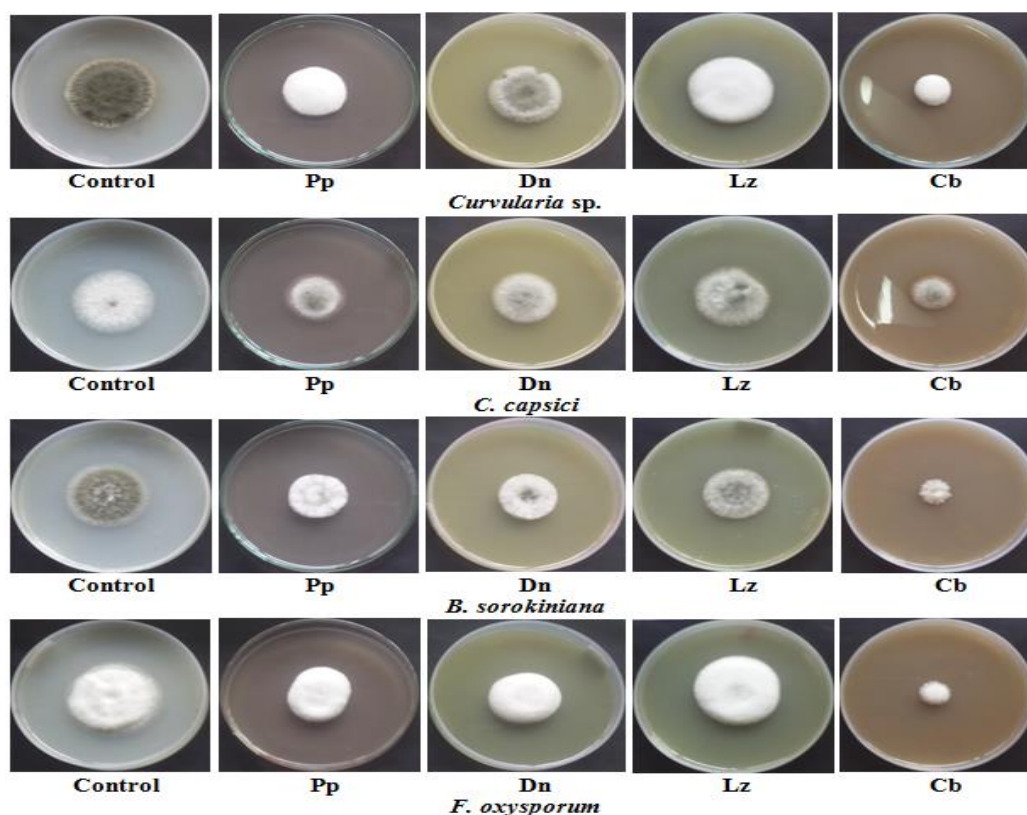
## RESULTS AND DISCUSSION

The result of antifungal efficacy of orchid extracts in terms of mycelial growth inhibition of test fungi is shown in Table 1 and Figure 1 and 2. Poisoning of medium with orchid extracts resulted in considerable suppression of mycelial growth of test fungi. In

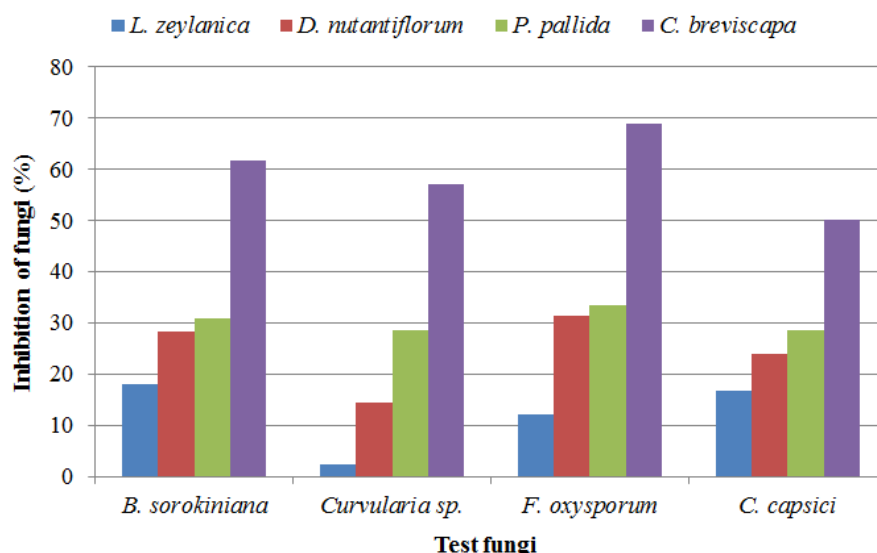
poisoned plates, the mycelial growth was shown to be comparatively smaller when compared to fungal growth on control plates. The orchid extracts displayed varied antifungal potency. Among orchids selected, marked antifungal efficacy was observed in case of *C. breviscapa*. Extract of *L. zeylanica* displayed least inhibitory activity against test fungi. Extract of *L. zeylanica* inhibited *C. capsici* to higher extent whereas extract of *D. nutantiflorum*, *P. pallida* and *C. breviscapa* inhibited *F. oxysporum* to high extent among other fungi. An inhibition of 50% and higher of test fungi was observed in case of extract of *C. breviscapa*. Orchids were shown to exhibit antifungal activity against a variety of mold species. In an earlier study, Marasini and Joshi [9] observed inhibitory effect of some orchid species such as *Pholidota imbricata*, *Dendrobium nobile*, *D. amoenum*, *Coelogyne cristata* and *C. stricta* from Nepal against *Rhizopus stolonifer* and *Mucor* spp.

**Table-1: Colony diameter of test fungi on control and poisoned plates**

Treatment	Colony diameter in cm			
	<i>B. sorokiniana</i>	<i>Curvularia</i> sp.	<i>F. oxysporum</i>	<i>C. capsici</i>
Control	3.9	4.2	4.8	4.2
<i>L. zeylanica</i>	3.2	4.1	4.2	3.5
<i>D. nutantiflorum</i>	2.8	3.6	3.3	3.2
<i>P. pallida</i>	2.7	3.0	3.2	3.0
<i>C. breviscapa</i>	1.5	1.8	1.5	2.1



**Fig-1: Growth of test fungi on control and poisoned plates**



**Fig-2: Inhibition (%) of test fungi by extract of selected orchids**

## CONCLUSION

Extracts of selected orchids have caused considerable suppression of mycelial growth of test fungi indicating their possible utilization (in suitable formulation) for controlling mycotic diseases of crops. Further field studies are to be carried out.

## ACKNOWLEDGEMENTS

Authors thank Head, Department of Microbiology and Principal, S.R.N.M.N College of Applied Sciences and N.E.S, Shivamogga for providing facilities and moral support to carry out work.

## REFERENCES

- Cowan MM; Plant products as antimicrobial agents. *Clinical Microbiology Reviews*, 1999; 12(4): 564-582.
- Poorniammal R, Sarathambal C; Comparative performance of plant extracts, biocontrol agents and fungicides on the diseases of sunflower. *Indian Journal of Weed Science*, 2009; 41(3,4): 207-209.
- Kumaran RS, Gomathi V, Kannabiran B; Fungitoxic effects of root extracts of certain plant species on *Colletotrichum capsici* causing anthracnose in *Capsicum annuum*. *Indian Phytopathology*, 2003; 56(1): 114-16.
- Rakesh KN, Dileep N, Junaid S, Kekuda PTR, Vinayaka KS, Nawaz NAS; Inhibitory effect of cow urine extracts of selected plants against pathogens causing rhizome rot of ginger. *Science, Technology and Arts Research Journal*, 2013; 2(2): 92-96.
- Dileep N, Junaid S, Rakesh KN, Kekuda PTR, Nawaz ASN; Antifungal activity of leaf and pericarp extract of *Polyalthia longifolia* against pathogens causing rhizome rot of ginger. *Science, Technology and Arts Research Journal*, 2013; 2(1): 56-59.
- Vinayaka KS, Kekuda PTR, Nawaz NAS, Junaid S, Dileep N, Rakesh KN; Inhibitory activity of *Usnea pictoides* G.Awasthi (Parmeliaceae) against *Fusarium oxysporum* f.sp. *zingiberi* and *Pythium aphanidermatum* isolated from rhizome rot of ginger. *Life Sciences Leaflets*, 2014; 49: 17-22.
- Maridass M, Hussain ZMI, Raju G; Phytochemical survey of orchids in the Tirunelveli Hills of South India. *Ethnobotanical Leaflets*, 2008; 12: 705-712.
- Jalal JS, Jayanthi J; Endemic orchids of peninsular India: a review. *Journal of Threatened Taxa*, 2012; 4(15): 3415-3425.
- Marasini R, Joshi S; Antibacterial and antifungal activity of medicinal orchids growing in Nepal. *Journal of Nepal Chemical Society*, 2012; 29: 104-109.
- Pant B; Medicinal orchids and their uses: Tissue culture a potential alternative for conservation. *African Journal of Plant Science*, 2013; 7(10): 448-476.
- Sandrasagaran UM, Subramaniam S, Murugaiyah V; New perspective of *Dendrobium crumenatum* orchid for antimicrobial activity against selected pathogenic bacteria. *Pakistan Journal of Botany*, 2014; 46(2): 719-724.
- Gutiérrez RMP; Orchids: A review of uses in traditional medicine, its phytochemistry and pharmacology. *Journal of Medicinal Plants Research*, 2010; 4(8): 592-638.
- Singh S, Singh AK, Kumar S, Kumar M, Pandey PK, Singh MCK; Medicinal properties and uses of orchids: a concise review. *Elixir Applied Botany*, 2012; 52: 11627-11634.
- Kiran R, Kekuda PTR, Kumar PHG, Hosetti BB, Krishnaswamy K; Biological activities of *Sarcanthus pauciflorus*. *Journal of Applied Pharmaceutical Science*, 2013; 3(7): 105-110.
- Chinsamy M, Finnie JF, Van Staden J; Anti-inflammatory, antioxidant, anti-cholinesterase activity and mutagenicity of South African medicinal orchids. *South African Journal of Botany*, 2014; 91: 88-98.

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16. Rashmi K, Shweta SD, Sudeshna CS, Vrushala PS, Kekuda PTR, Raghavendra HL; Antibacterial and radical scavenging activity of selected orchids of Karnataka, India. *Science, Technology and Arts Research Journal*, 2015; 4(1): 160-164.

17. Dileep N, Rakesh KN, Junaid S, Kekuda PTR, Vinayaka KS, Raghavendra HL; Antibacterial and radical scavenging activity of selected plants of Western Ghats of Karnataka, India. *Journal of Chemical and Pharmaceutical Sciences*, 2014; 7(2): 79-84.