



## RESEARCH ARTICLE

## Identification of cyanobacterial association from the roots of the terrestrial orchid, *Spathoglottis plicata* Blume

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**Abstract**

Two cyanobacterial species belonging to the family Oscillatoriaceae are reported from the underground roots of the terrestrial orchid, *Spathoglottis plicata*. Cyanobacterial community on the orchid roots depended on the conditions of the plant growth. Very little is known about the species level taxonomic descriptions of orchid associated cyanobacteria and hence our study is the first report on the species level cyanobacterial association with the terrestrial orchid, *Spathoglottis plicata*.

**INTRODUCTION**

Cyanobacteria are unique in their capacity to form symbiotic associations with remarkable range of eukaryotic hosts. They are seen attached to plant parts, which serve as a support. Nitrogen fixation by cyanobacteria - orchid association is greatly influenced by existing environmental factors such as water availability, pH, temperature etc. The cyanobacterial association with angiosperms is rare in nature, but a few associations were reported (Tsavkelova *et al.* 2001; Tsavkelova *et al.* 2003 a; Tsavkelova *et al.* 2003 b; Ram and Shamina, 2014; Ram and Shamina, 2015).

*Spathoglottis plicata* Blume is a terrestrial orchid, sometimes called, "Ground Orchid". Cyanobacterial community is populated when there is persistent moisture avail in the environment. The association of cyanobacteria with orchids are still poorly studied. In general, little is known regarding cyanobacteria-orchid association and the species level cyanobacterial identification is not much explored.

Taxonomic assignment of orchid associated cyanobacteria has not yet been carried out, since the occurrence of cyanobacterial association are very rare with the terrestrial orchid. The aim of the present study was to identify the cyanobacteria obtained from the underground roots of the terrestrial orchid. The present study analysed the species level cyanobacterial association from the underground roots and hence this study is the first report on species level cyanobacterial identification from the terrestrial orchid, *Spathoglottis plicata*.

**Materials and Methods**

The present study used mature terrestrial orchid, specifically, underground roots of *Spathoglottis plicata*, which was grown in a pot. The roots were collected with the growth substrates (along with sand particles) using scalpels and needles. Cyanobacterial mat was removed and suspended in a bottle containing double distilled water. The bottle was agitated to detach the sand particles were allowed to settle down. The supernatant cyanobacteria collected and

transferred to a new bottle. The collected specimens were deposited in the Plant Diversity Division, University of Calicut and voucher number (CU 139333) was assigned.

Microscopic analysis was done in the live condition for the identification of cyanobacteria. Microphotographs were taken using Leica DM 1000 LED compound microscope. Cyanobacterial identification was done with the manuals (Anand, 1989; Desikachary, 1959; Prescott, 1982).

## Result and Discussion

The present study dealt with the species level taxonomic identification of cyanobacteria associated with the terrestrial orchid. Two cyanobacterial species belonging to the family Oscillariaceae were identified from the underground roots of terrestrial orchid. Detailed taxonomic description of these two organisms and their microphotographs is also given.

### 1. *Phormidium bohneri* Schmidle (Fig. a)

Thallus thin, mucilaginous, green, trichome straight, not constricted at the cross walls, filaments 1.325  $\mu\text{m}$ -2.500  $\mu\text{m}$  broad, 1.702  $\mu\text{m}$ -3.106  $\mu\text{m}$  long, cells longer than broader, end cell rounded.

### 2. *Oscillatoria foreau* Freymy (Fig. b)

Trichome sparse, elongate, distinctly constricted at the cross walls, 3.405  $\mu\text{m}$ -4.272  $\mu\text{m}$  broad, 3.224  $\mu\text{m}$ -5.544  $\mu\text{m}$  long, apical cells obtuse rounded.

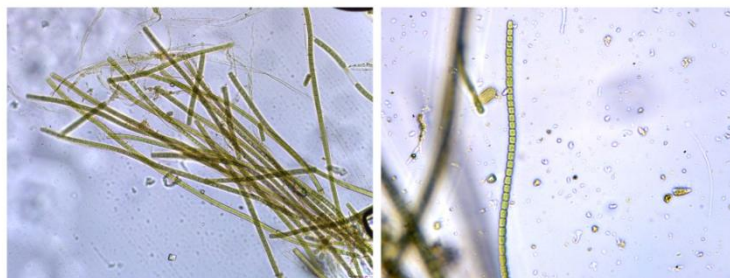


Fig. a) *Phormidium bohneri*; b) *Oscillatoria foreau*

The result of the study reveals that the underground roots of the terrestrial orchid are shown the presence of cyanobacterial association. The present study identified *Phormidium bohneri* and *Oscillatoria foreau* from the roots of *Spathoglottis plicata*. The cyanobacterium, *Dactylococcopsis acicularis* had been reported from the roots of the terrestrial orchid, *Spathoglottis plicata* (Untari *et al.* 2009). Soil cyanobacteria are incapable of nitrogen fixation and at the same time, some unicellular and filamentous cyanobacteria can fix nitrogen without heterocyst formation (Pankratova, 1987). The cyanobacterial species identified from the roots of terrestrial orchid confirm that these organisms are having a strong symbiotic association with the orchid.

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