Lichen flora of Pichavaram and Muthupet mangroves (Southeast Coast of India)

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An enumeration of 21 species belonging to 14 genera and 10 families of lichens are provided from Pichavaram and Muthupet mangroves of Tamil Nadu State.

Key words – lichenized ascomata – lichen taxonomy – mangroves of Tamil Nadu – Muthupet Lagoon

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Introduction
Mangroves are the unique ecosystem developed along estuarine seacoasts and river mouths in tropical and subtropical regions of the world. They are commonly found in the intertidal zone and are a bridge between terrestrial and marine ecosystems, harbouring a unique microbial biodiversity. Mangrove forests are one of the world’s most productive tropical ecosystems (Smith et al. 1991, Kathiresan 2000, Logesh et al. 2012).

Due to their unique nature and physiology lichens have an ability to colonize various substrates as epiphytes. The different species of phorophytes provide excellent habitat for lichens to colonize on their trunk, branches, twigs and even on leaves. The nature and texture of tree bark plays a vital role in colonization by lichens. Lichens present in the mangroves are termed manglicolous lichens. The population of lichens on mangroves is very low when compared to the lichens of terrestrial ecosystems, as their growth is arrested by the high level of salinity and moisture. Accounts of the diversity and distribution of lichens growing on trees in India has been provided by Upreti & Chatterjee (1999), Satya et al. (2005), and Rawat et al. (2009). However, except for a little information (Mohan & Hariharan 2000, Jagadeesh Ram 2006), no account of lichens from Indian mangroves are available. In the present study, an attempt has been made to enumerate the lichens growing on mangroves of Pichavaram and Muthupet of Southeast Coast of India.

Pichavaram mangroves are situated at the delta of Vellar and Coleroon and make a Vellar-Coleroon estuary complex, considered among the healthiest mangrove occurrences in the world. It is located at N 11° 2’ 00.9”, E 79°
47° 11.2" and consists of Avicennia, Rhizophora and Excoecaria as the major vegetation.

Muthupet mangroves are situated in the Palk Strait region (N 10° 25' 79.5", E 79° 39' 00.2") and it is also a lagoon type ecosystem. Avicennia marina and Excoecaria agallocha are found as single dominant species, with Rhizophora in a few patches. The rivers Paminiyar, Koraiyar, Kilaithankiyar, Marakkakoraiyar and other tributaries of the river Cauvvery flow through Muthupet and adjacent villages. The rivers form a lagoon before meeting the sea. The northern and western borders of the lagoon are occupied by muddy silt ground which is devoid of mangroves. The mangroves beyond Muthupet lagoon are discontinuously found along the shore and extended up to Point Calimere.

Methods

The present study is based on an examination of 250 specimens of lichens collected during December 2010 to November 2011. The specimens were examined morphologically, anatomically and chemically. The chemical components of the lichens were identified by the standardized TLC methods (Orange et al. 2001) and crystallography. Chromatograms were developed in the solvent system A (toluene: dioxan: acetic acid, 180:60:8). The specimens were identified and authenticated following literature on lichens by Awasthi (1991, 2007). Voucher specimens were deposited in the Herbarium of National Botanical Research Institute, Lucknow (LWG).

Lichen species of Pichavaram and Muthupet Mangroves


Specimen examined – Pichavaram mangroves, Main Channel, on bark of Rhizophora apiculata, 22.12.2010, Logesh Aacharya Raja & Kandasamy Kathiresan. 10-012316 (LWG).


Specimen examined – Pichavaram Mangroves, Main Channel, on bark of Rhizophora apiculata, 22.12.2010, Logesh Aacharya Raja & Kandasamy Kathiresan. 10-012322 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of Rhizophora sp., 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-016817 (LWG).


Specimen examined – Muthupet Mangroves, Sethuguda area, on bark of Avicennia sp., 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-012324 (LWG).


Specimen examined – Pichavaram mangroves, Main Channel, on bark of Excoecaria agallocha, 22.12.2010, Logesh Aacharya Raja & Kandasamy Kathiresan. 10-012308 (LWG).


Specimen examined – Pichavaram mangroves, Main Channel, on bark of


This species is a new record for Tamil Nadu State.

Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Avicennia sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-012325 (LWG).

12. **Lecanora achroa** Nyl. in Crombie, J. Linn. Soc., Bot. 14: 263 (1876). (Lecanoraceae)

This species is a new record for Tamil Nadu State.


13. **Lecidea granifera** (Ach.) Vain. in Hiern, Cat. Welwitsch Afric. Pl. 2(2): 424. 1901. (Lecideaceae)

Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Excoecaria sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-012322 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Avicennia sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-016818 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Avicennia sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-016816 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Avicennia sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-012326 (LWG).


Specimen examined – Pichavaram mangroves, Main Channel, on bark of *Avicennia officinalis*, 22.12.2010, Logesh Aacharya Raja & Kandasamy Kathiresan. 10-012320 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Rhizophora sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-016817 (LWG).


Specimen examined – Muthupet mangroves, Sethuguda area, on bark of *Excoecaria sp.*, 16.11.2011, Logesh Aacharya Raja & Arumugam Sathishkumar. 11-016816 (LWG).

20. **Pyxine cocoeces var. prominula** (Stirt.) D.D.Awasthi, Indian J. Bot. 3(2): 183. 1980. (Caliciaceae)


Key to the lichen species of Pichavaram and Muthupet mangroves

1. Thallus foliose or fruticose.................................................................2
1a. Thallus crustose ....................................................................................7
1b. Thallus foliose. ..................................................................................3
2. Thallus loosely attached to the substrate, rhizines present...........Roccella montagnei
3. Thallus tightly adpressed to the substrate, rhizines absent..................5
4. Large thallus lobes, up to 20 mm wide, upper side grey........Parmotrema tinctorum
4a. Small thallus lobes, up to 1–2 mm wide, UV+..............................Pyxine cocoës var prominula
5. Thallus without isidia and soredia......................................................Dirinaria confluens
5a. Thallus isidiate or sorediate..................................................................6
6. Thallus with thick isidia or dactyls becoming crateriform and sorediate apically...........Dirinaria aegialita
6a. Thallus lacking isidia and soredia on lamina..................................Dirinaria applanata
7. Apothecia or perithecium present.........................................................8
7a. Apothecia absent, thallus whitish grey, soredia with calcium oxalate crystals....................................Herpotrallion granulosum
8. Fruiting body perithecium.................................................................9
8a. Fruiting body apothecium..................................................................11
9. Ostioles apical, ascospores 3-septate, without cilia, ascospores mostly less than 50 μm long, spores subducta type........................................Pyrenula interdacta
9a. Hamathecium filaments unbranched, endospore thickened......................10
10. Ascospores muriform, less than 80 μm long, 4–8 per ascus, hamathecium not inspersed.................................Pyrenula leucostoma
10a. Ascospores transversely septate, 10–23 μm long with 3 primary septa..Pyrenula ochraceoflava
11. Apothecia lirellate.................................................................................12
11a. Apothecia round to sessile................................................................16
12. Ascocarps sunken or sessile, round to elongate......................................13
12a. Ascocarps not sunken, paraphyses branched and raised from the thallus........14
13. Spores 1–3-septate, fusiform, 15–16 × 2–3 μm, ascosporas minute.....Opegrapha subrimulosa
13a. Ascosporas curved, constricted at base, spores 20–25 × 3–4 μm...............Opegrapha vulgata
14. Disc distinctly white, pruinose, paraphyses branched..........................Diorygma junghuhuini
14a. Ascosporas generally not fissuring, labia well developed and distinctly carbonized........15
15. Hymenium inspersed with oil globules, spores transversely septate 25–40 × 4.5–7.5 μm, 5–9-septate.................................................................Graphis lineola
15a. Hymenium clear, not inspersed with oil globules, spores transversely septate, 18–60 × 6–8.5 μm, 5–13-septate........................................Graphis scripta
16. Apothecia lecanorine........................................................................17
16a. Apothecia lecideine..............................................................................18
17. Apothecia round, sessile, up to 1 mm in diameter; smooth, verruculose, upper cortex hyaline, inspersed with small crystals pigmentation dissolving in K...........................Lecanora achroa
17a. Apothecia scattered to clustered, sessile, round, disc ferrugineous to reddish brown, thalline margin absent..............................................Caloplaca ferruginea
18. Excipulum hyaline, formed by paraplectenchymatous tissue.......................19
18a. Excipulum indistinctly or distinctly cellular, epithecium brown to olive brown.................................................20
19. Spores hyaline, transversely septate..............................................Bacidiopsora psorina
19a. Spores simple, ovoid to ellipsoid, thick-walled, 8-spored..................Lecidea graminea
20. Hymenium inspersed with oil globules, epithecium dark brown, spores 22–23 × 8–9 μm........................................Buellia confusa
20a. Hymenium not inspersed with oil globules, spore sessile, internal stipe dark brown, spores 18–19 × 9–10 μm.................................Amandinea montana

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