

What do epiphytic lichens of Guwahati city indicate?

Lichens are composite organisms consisting of a symbiotic association of a fungus with a photosynthetic partner, either a green alga or a Cyanobacteria, grow in diverse climatic conditions and on equally diverse substrata and are widely distributed in almost all the phytogeographical regions of the world. An 'annotated checklist' published by the Botanical Survey of India (BSI) documents 2303 species belonging to 305 genera and 74 families in India¹.

Lichens are a major section of species that are sensitive to changes in atmospheric nutrient conditions² and have been used as bioindicators of pollution over a long period of time, especially sulphur dioxide (SO₂)³. Fruticose lichens are known to be the most sensitive to air pollution, followed by foliose and crustose forms. The vanishing of sensitive lichen species due to changes in microclimatic conditions and air pollution has been reported from Indian cities of Bangalore⁴ and Kolkata⁵. Due to the fast rate of disappearance of flora for a range of reasons like habitat loss, air pollution, changes in the microclimatic conditions and uncontrolled harvest, lichen biologists have initiated a discourse to creating 'protected areas' for conservation of lichens⁶. Systematic studies on lichens in India, however, are still sporadic. More so, there are instances of limited studies in the northeastern region of India, which is also a biological hotspot.

Guwahati is the largest city in the northeastern region of India, and the second metropolitan in eastern India after Kolkata. The city is situated between the

Brahmaputra River to the north and the foothills of the Shillong plateau to the south. It is one of the most rapidly growing cities in India. During the past few decades the city has experienced uncontrolled expansion in terms of area, population, number of automobiles and polluting industrial units, leading to the degradation of air quality. The fate of many lichens genera of Guwahati city, therefore, could be bleak and probably could perish unnoticed in the future.

A study was undertaken during July 2010 to understand the epiphytic lichen diversity of Guwahati city. Random collection of epiphytic lichen species was done from a single tree species, *Delonix regia*, which is common in all the three representative localities of Guwahati city, with distinct polluting activities, viz. industrial (Noonmati Refinery area), residential (Kahilipara Battalion Gate) and highway (Jalukbari area) that were chosen. Phorophytes that were above 70 cm in diameter were considered and lichens were collected at a height between 1 and 1.5 m from the ground. A total of 91 samples were collected and further identified at the National Botanical Research Institute (NBRI), Lucknow.

We found only two growth forms of lichens, namely crustose and foliose; fruticose lichens were not found in the study. Species belonging to five families, namely Arthoniaceae, Graphidaceae, Lecanoraceae, Physciaceae and Thelotremataceae were identified. Graphidaceae, a crustose form, is found to be the most dominant.

As the three localities vary significantly in the pollution strength and type, we made an attempt to see how difference in air-pollution load affects the lichen growth forms in totality. The representation of the growth forms is illustrated in Figure 1. It was interesting to note how the foliose growth form was diminishing from industrial (38%) and highway (14%) localities compared to the residential locality (50%). Highways receive loads of SO₂ from the diesel-powered automobiles, which could have resulted in the depleted foliose growth form. Some residential areas in Guwahati city, like the Battalion Gate, experience less air pollution and hence support lichen growth. However, keeping the changes in climatic parameters and air quality of Guwahati city in mind, more studies of lichens vis-à-vis air pollution are imminent.

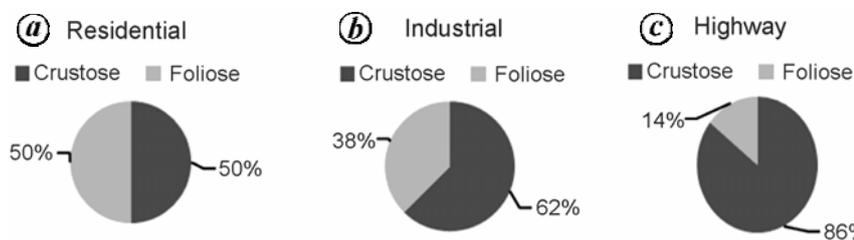


Figure 1. Representation of growth forms of lichens borne by tree species, *Delonix regia*, in Guwahati city.

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