

# Unwinding the World of Climbers and Lianas with Dr. Vivek Pandi

Dr. Vivek Pandi is a plant ecologist who has spent close to a decade studying the ecology and biodiversity of climbers and has contributed significantly to research on Indian climbers. He holds a Ph.D. in ecology of woody climbers and has a longstanding research interest in understanding the evolution of climbing behaviour in plants. He is currently studying the taxonomy, systematics, and phylogenetics of Indian climbing flora. He has published over 15 research materials on various themes of climber ecology. In addition, he has established a one-hectare permanent monitoring plot in India's Western Ghats biodiversity hotspot to understand better the dynamics of liana communities and their impact on forest structure. He is currently employed as an assistant professor of evolutionary biology at the Manipal Centre for Natural Sciences, Manipal Academy of Higher Education in India.



Tree and climber intertwined. © B. Ravichandran.

## Liana in tropical dry evergreen forest of India

In many tropical forest ecosystems, lianas are an inevitable element, making up to 32% of woody stems and 35% of the variety of woody species. Unlike trees, lianas are incapable of autonomous vertical growth above a certain height and therefore, they must rely on external support to reach forest canopy. However, lianas are evolved with diverse climbing structures and strategies that aid in attaching to the host trees and expose themselves to light-rich environments. Further, lianas are also known for their peculiar characteristics including their biomechanical properties, anatomical modifications, extreme



Dr. Pandi explaining about types of climbers. © Tandrali Baruah.

stem hydraulic capacities and their extraordinary developmental plasticity (Pandi 2016).

Lianas play a major role in tropical forest dynamics by competing with trees for both aboveground and belowground resources, resulting in reduced recruitment, regeneration, growth, fecundity and survival of trees (Pandi & Parthasarathy 2015). There are five different climbing mechanisms (HC – hook climber; ST – stem twine; TC – tendril climber; SCR-A – armed-scrambler; SCR-UA – unarmed-scrambler). The unique physical networks between trees and lianas are often controlled by host species’ traits. As expected, the host trees with mid- and high WSD (water saturation deficit) values are more prone to be infested by lianas, whereas trees with low-WSD are less infested in the studied forest (Pandi & Parthasarathy 2017).

Lianas are known for their ability to exploit aboveground resources in seasonal forests, utilizing the prevailing high solar radiation in the dry seasons. Lianas often form a dense carpet of leaves over the host trees’ crown, limiting or leaving no light for the trees to perform photosynthesis. Furthermore, liana colonization



**Pre debate discussion of team Forest managers.**  
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on host trees is becoming more common in the tropics (Pandi et al. 2023). The dominant plant families in which most of the climbers found are Cucurbitaceae, Menispermaceae, Convolvulaceae. The interesting thing is there are 2,624 species of climbers belonging to 196 families, 585 belonging to the genus piper, 104 families of only Fabaceae.

### **Our interaction with a liana specialist**

On 16–17 October 2023, we had an interesting, fun-filled debate among ourselves where we were divided into two groups and a common scenario was given to us in which we were expected to speak on lianas in a plantation. One group represented forest managers and the other represented conservationists. The debate provided us a platform to recall and recollect our



**Pre debate discussion of team conservation scientist.**  
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understanding and learnings from Vivek Pandi’s session. Strong and valid arguments about liana growth, occupancy, faunal species, presence and importance of biodiversity in the plantation 2 species with 34 species of lianas.

He then explained the importance of lianas in the forest where they have ecological roles like food, microclimate, carbon sequestration, and

many more. We were asked whether a tree can grow like liana and our answer was no but, he said it is possible by giving us the evolutionary process of how climbers have evolved from trees.

The last part of the session was about the estimation of the vegetation cover that existed in the past and it was possible by using phytoliths and other microfossils which was also a completely new learning for us.

### **Vivek Pandi's contribution in the field of climbers and grasses**

Dr. Vivek Pandi's contribution to climbers, especially liana research is incredible and significant, since there are very few liana researchers in India. He has mapped the ecology of lianas in the entire peninsular India. He has published a book 'Taxonomy and Ecology of Climbers – Climbing Plants of India'. The most fascinating thing he came to know is the pattern of tree-liana interactions in the tropical forest in India, whether climate change is going to affect the interaction, and how it will affect the structure of the forest. His few other research areas are functional trait analysis of lianas, host preferences, including the current status and future prospects of climber research in India.

One more interesting work is on the 'Diversity and carbon stock assessment of trees and lianas in tropical dry evergreen forest on the Coromandel coast of India'. Apart from climbers, his team is doing research on the plant *Indianthus virgatus*, yet another rarely touched topic in India- the 'monotypic taxa' in angiosperms. Another fascinating dimension of their work is on understanding the past vegetation and temperature of a landscape

or in short 'paleoecology' based on the silica crystals called 'phytoliths' inside the cells of grasses! Through phytoliths they are also trying to understand the origin and patterns of fires in the wild places.

### **Walk with Pandi in Pushpagiri mountain range**

On 05 November 2023, we got an opportunity to have on-site learning about lianas in their natural habitat during a trail walk in the reserve forest of Pushpagiri Wildlife Sanctuary, he explained us about the types of armed and unarmed scramblers and how the plants of genus *Amorphophallus* are capable to change their sex annually depending on their external environments and also how most of the evergreen trees have a prime characteristic feature of having serrated margins to increase the transpiration rates.

The interesting plant adaptation that he told us about is the change in leaf margin of *Olea* sp. Some leaves show serrate margin while others have the entire margin. We were amazed to see the leaf arrangement of *Macaranga* leaves in such a way that all of them receive equal sunlight and also came across an unidentified *Ceropegia* species. Along the way, we also



Field visit with Dr. Pandi in Pushpagiri, Coorg.  
 © B. Ravichandran.

encountered the *Careya arborea* tree and got to know the dependency of mammals like Gaur and Elephants on its fruit. It was a very informative and fun learning experience.

### Conclusion

One of the most noticeable features of tropical forest ecosystems is climbers. In fact, their ability and presence often serve as a distinguishing factor between tropical forests and temperate ecosystems. The diminished prevalence of climbers in temperate woods is linked to the vascular systems' malfunctioning in colder climates. Both natural and man-made causes can have an impact on the variety of lianas. Numerous important abiotic elements, such as rainfall, rainfall seasonality, soil edaphic factors like soil type and structure, texture, pH, salinity, moisture, temperature, organic carbon, nitrogen content, heavy metal content impact the abundance of liana. Ecology of liana is still unexplored. The world of Liana is still mysterious and untouched.

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