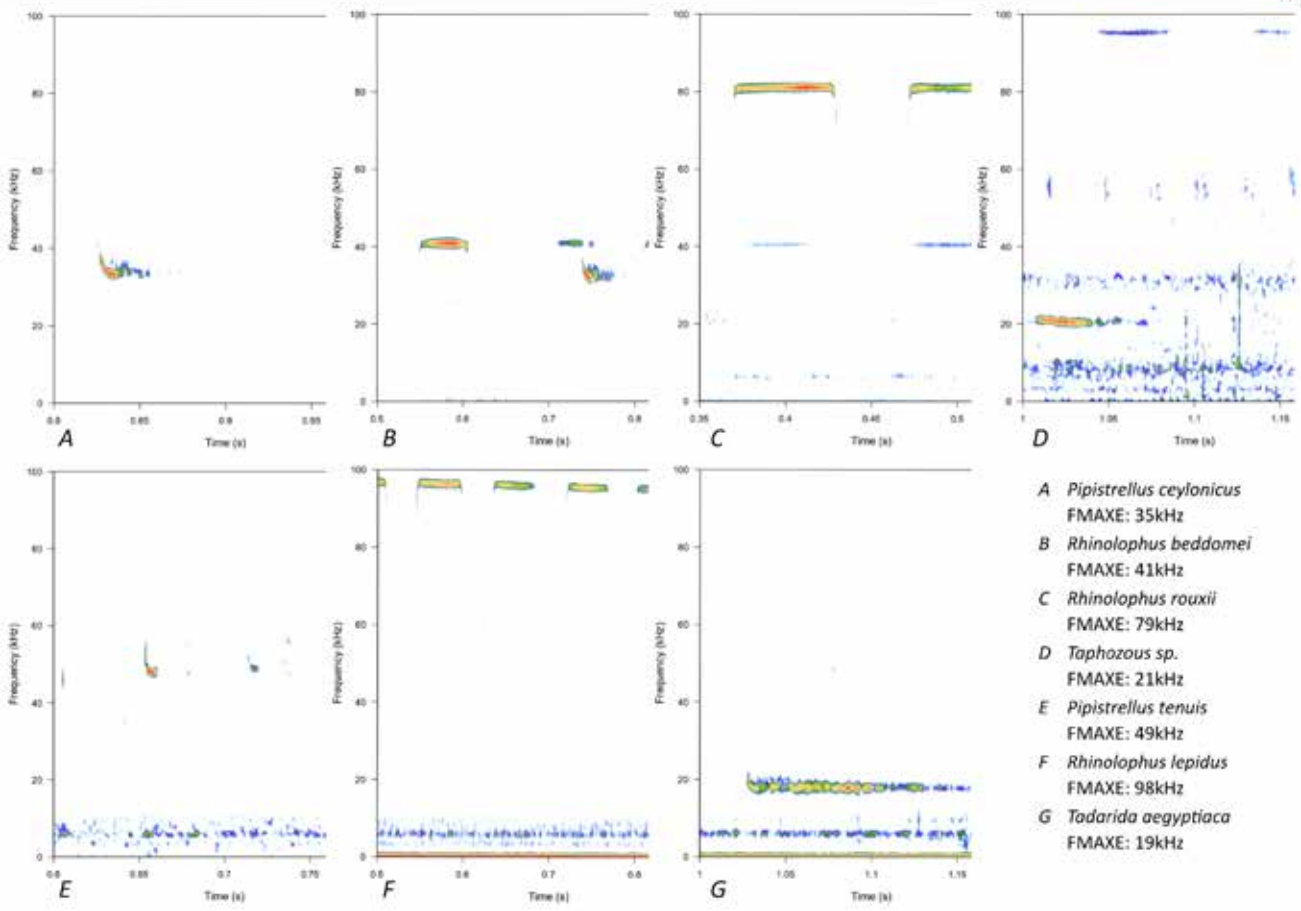
Echolocating bats at an organic coffee and spice plantation in the Western Ghats

Nestled in the heart of the Western Ghats biodiversity hotspot, Mojo Plantation in Kodagu District, Karnataka (12.47º N, 75.71º E) is a unique coffee and spice plantation that seeks to integrate sustainable agricultural practices with education, outreach, and ecotourism. Since the mid-1990s, this 25-acre site has been managed as-wild, maintaining a forest-like canopy and highly diverse undergrowth, and promoting a high diversity of pest-suppressing predator species including birds, snakes, and bats.

Despite the high diversity of bats across the Western Ghats (Srinivasulu et al. 2024), the last directed survey of bats conducted in Mojo Plantation by Molur (2009) reported only two echolocating bat species—Kelaart's Pipistrelle *Pipistrellus ceylonicus* and Least Pipistrelle *Pipistrellus tenuis*—from the plantation. However, recent passive acoustic surveys elsewhere in Kodagu District including Kushalanagara, Nisargadhama, and Makutta have indicated the presence of four additional species—Greater False Vampire Bat *Lyroderma lyra*, Lesser False Vampire Bat *Megaderma spasma*, Srini's Bent-winged Bat *Miniopterus srinii*, and Peyton's Myotis *Myotis peytoni*—hinting at a much richer bat diversity in the

Detectors used in the survey: Pettersson u384 and Wildlife Acoustics Echo Meter Touch 2 Pro (left), and Pettersson D500x in situ (right).



Spectrograms of the seven echolocating species observed on the site.

region than hitherto known (Srinivasulu & Srinivasulu 2023; Srinivasulu et al. 2025).

From 14–17 November 2025, the Zoo Outreach Organisation conducted a field visit as part of the Ram Hattikudur Advanced Training in Conservation course to the Rainforest Retreat at Mojo Plantation. As part of this visit, we assessed the diversity of echolocating bats in and around the plantation including by the Kalur River (a tributary of the Kaveri) around 4 km away using passive acoustic monitoring of echolocation calls.

Bat echolocation calls were recorded on the nights of 14th and 16th November using one stationary ultrasound detector: Pettersson D500X (500 kHz sampling frequency); and two mobile ultrasound detectors: Pettersson u384 and Wildlife Acoustics Echo Meter Touch 2 Pro (both at 384 kHz sampling frequency). The mobile detectors were used in conjunction with smartphones at various locations in and around the plantation and by the river, while the stationary detector was placed in a large clearing facing southwards into the main plantation area. Recorded bat calls were analysed using Wildlife Acoustics Kaleidoscope Pro and visualised using the Seewave package (Sueur et al. 2006), and call type and parameters were compared to Srinivasulu et al. (2025) for identification.

Apart from confirming the continued occurrence of *Pipistrellus ceylonicus* and *P. tenuis* in the area, echolocation calls from these surveys indicated the confirmed presence of at least five other species: Beddome's Horseshoe Bat *Rhinolophus beddomei*, Blyth's Horseshoe Bat *Rhinolophus lepidus*, Rufous Horseshoe Bat *Rhinolophus rouxii*, Egyptian Free-tailed Bat *Tadarida aegyptiaca*, and an unidentified tomb bat *Taphozous* sp. Three unknown frequency-modulated (FM) and two unknown frequency-modulated with quasi-constant frequency (FM-QCF) signals were also observed, but could not be reliably identified to genus- or species-level, indicating a yet higher diversity of echolocating bats in this region. We also observed the Indian Flying Fox *Pteropus medius* overhead, and found scat traces of the Greater Short-nosed Fruit Bat *Cynopterus sphinx* on the site – including these, the current confirmed bat diversity in and around Mojo Plantation is nine species of six genera, with four more species likely to exist but currently unconfirmed.

This survey demonstrates the use of passive acoustic monitoring to inventory bat species diversity in a region while also highlighting the need for strong comparative datasets like Srinivasulu et al. (2025), especially when studying these little-known and less-studied species in a biodiversity hotspot such as the Western Ghats.

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Aditya Srinivasulu
Research Affiliate, Zoo Outreach Organisation,
3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India.
Email: a.chelmala1@gmail.com.

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