



**Figure 1.** *a*, *Ensete superbum* under natural condition. *b*, Opening stage of inflorescence. *c*, Later stage of inflorescence. *d*, Seeds.

eral medicinal plants for conservation under the Medicinal Plant Conservation Area<sup>11</sup> (MPCA). Hence its relict population in natural habitat should be ascertained for *in situ* and *ex situ* conservation. The plant is still categorized as wild and little information pertaining to agrotechniques is available. Therefore attention of researchers towards detailed agrotech-

niques and chemical screening are strongly recommended.

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## Nectar robbery in bird pollinated mangroves!

Pollination syndromes are suites of flower characteristics (morphology, colour, nectar and odour) that supposedly attract particular pollinators to specific flowers<sup>1</sup>. In fact, pollination requires a degree of co-evolution between lineages of flowering plants and their mutualists. But sometimes mutualism could be exploited and floral nectar may be illegitimately accessed by insects and avifauna without performing a pollination service<sup>2</sup>. We report here a case of nectar robbery in *Bruguiera gymnorhiza* and *Bruguiera sexangula* belonging to Rhizophoraceae that are exclusively pollinated by sunbirds (*Leptocoma*). Both species have brightly coloured flowers that produce about 40–60 µl of nectar/day, translating to about 1.6–2.0 million of pollen over the life of each flower (15–20 days).

Avian visitors insert their long tongues deep into the lower part of the flowers and gain access to nectar. In the process, they trip upon anthers and trigger explosive release of pollen.



**Figure 1.** Nectar foraging by a social bee (*Apis dorsata*).

During late October at Pudukkottai, Kerala (10°02'13"N; 76°13'19"E), we recorded solitary and social bees frequenting *B. gymnorhiza* (Figures 1 and 2). Bee visits were continuous from



**Figure 2.** A solitary bee (*Nomia* sp.) visiting *Bruguiera gymnorhiza*.



**Figure 3.** An ant visiting to forage nectar in *Bruguiera sexangula*.

07:00 to 17:00 h and the duration of visits to individual flowers ranged about 30–45 s. Like the legitimate avian polli-

nators, *Apis dorsata* bees also foraged in the lower parts of the flower and accessed the nectar. But their pollen basket (Corbicula) remained empty. The bees also mopped the excess nectar oozing from ovary adhering to the anthers and calyx cup. It has been observed in the past that bees trigger the release of pollen in ornithophilous species<sup>3</sup>. However, we could not record any such instance in *B. gymnorrhiza*. It appears that bees were collecting nectar but not pollen. Interestingly, by early December the insect visitors had abandoned the study site, indicating migration to richer forage grounds. Such behavioural switching between robbing and legitimate pollination in bees is known<sup>4</sup>. Further, in *B. sexangula* we noticed nectar robbery by ants (Figure 3). In most of the opened flowers 3–5 ants were residing in the lower parts of the ovary. In future, it would be interesting to study the implication of nectar robbery by insects versus reproductive

success in true mangroves adapted to ornithophily.

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## Effect of casuarina (*Casuarina equisetifolia*) plantation on the sand skink (*Eutropis bibronii* Gray 1839) population

Skinks are found in a variety of habitats worldwide embracing a wide geographic distribution in the tropics. *Eutropis bibronii* Gray 1839 (Scincidae, Squamata), a fossorial species (Figure 1a) and named after Gabriel Bibron (1806–48) is diurnal in nature typically basking during the day. It is found in the east coast of Tamil Nadu in India, an habitat of native herbs and creepers – such as *Spinifex littoralis* that acts as sand binders, a pioneering plant in the sand dune ecosystem of the coastal areas. This skink was previously assigned under the genus *Mabuya*, but was later placed under the genus *Eutropis* after a taxonomic revision<sup>1,2</sup>. They exhibited sexual dimorphism with a red lining on the dorso-lateral side in males and a maximum number of hatchlings was sighted during January.

The initiation of a World Bank project during the summer of 2007 involved the planting of casuarina saplings (*Casuarina equisetifolia*) in the sand dunes of the east coast (Figure 1b) in order to raise a protective plantation – a bioshield to blunt the impact of high sea-waves

like the tsunami that struck the coast on 26 December 2004. The monoculture planting of casuarina covered more than one third of the Tamil Nadu coast, which grew densely covering most of the beach starting from the high tide line. Prior to planting of the saplings, parts of the sand dune with *S. littoreus* were burnt to enable unhindered growth of casuarinas; but, a few patches of the original vegetation with the ground trailer *S. littoreus* and were left unburnt, which provided a good microhabitat for *E. bibronii*. Though there are a few recent studies on the effects of casuarina plantation on an endangered species of sea turtle – the olive ridley turtle (*Lepidochelys olivacea*), little information is available on the lesser known reptile species such as *E. bibronii* inhabiting sand dunes and the effects of casuarina plantation on its population. Hence we initiated a study to find out whether casuarina plantation has any effect on lizard populations in their natural habitat of sand dunes at Vadanemmeli beach (12°44'N and 80°14'E) located 42 km south of Chennai, Tamil Nadu.

Our observations revealed that the average population abundance of *E. bibronii* was significantly reduced from  $21.00 \pm 15.4$  recorded in February–December 2006 to  $9.00 \pm 6.1$  in March–June 2007, which was probably due to the stress created in their population because of burning of *S. littoreus* as well as the shade provided by the casuarina plantation. The shade prevented the skink population from basking like before in their original habitat having *S. littoreus*. In consistence with the present findings, the casuarina plantations were reported showing adverse impact on the olive ridley sea turtles by encroaching upon the beaches, which visited east coast beaches for nesting during January to March every year as these beaches are their ideal nesting sites<sup>3</sup>.

Nevertheless, due to widespread protests by conservationists of olive ridley sea turtles, the Tamil Nadu Forest Department was compelled to remove the casuarina plantations up to a distance of 45 m from the high tide line in October 2008 (Figure 1c). Interestingly we observed that the removal of casuarina planta-