A nodal centre to screen microbial extracts for various properties

The isolation of cultures of microbes is rarely undertaken. This is more so in the case of fungi where mostly soil fungi are isolated but not from plant substrata. We in India have very few culture collection centres, including Microbial Type Culture Collection Centre (MTCC), Institute of Microbial Technology (IMTECH), Chandigarh, Microbial Culture Collection (MCC) affiliated to National Centre for Cell Science (NCCS), Pune, and the newly formed National Fungal Culture Collection of India (NFCCI) in Agarkar Research Institute, Pune. There are many colleges and institutes that are involved in the isolation of microorganisms throughout the country. But these cultures are lost over a period of time, after preliminary studies with them, and there is no continuum later on. Similarly, the institutes involved in screening for different pharmaceutical and therapeutic properties, including antimicrobial (antibacterial and antifungal), antimalarial, anti-algal, anti-tumour, antioxidant, anticancer, anti-Alzheimer's, anti-diabetic, etc. are scattered in different parts of the country. It would be prudent to have a common centre (nodal centre) where all the cultures could be screened. Researchers from different parts of the country involved in isolation of microbial cultures could send their cultures to this nodal centre for screening. Appropriate guidelines, terms and conditions could be framed for such a collaborative effort. In-depth studies of a few disease states is being undertaken at the Central Drug Research Institute (CDRI) in Lucknow. While CDRI-like institutes could continue to get involved in 'in-depth analyses' of the extracts, the suggested nodal centre could involve in initial screening of the microbial extracts and then distributing them to other centres/institutes where advanced research is undertaken on different disease-states in the respective laboratories/institutes. In fact the newly proposed nodal research centre, like CDRI, is worth having at a location along east coast of India or Deccan plateau. The purpose of the proposed centre is to coordinate the screening of extracts of different microorganisms collected from different parts of India. It could ideally work as a coordinating centre or a link between the institutes that supply the cultures of microorganisms. After initial screening at the proposed nodal centre, could coordinate with other institutes involved in advance research of particular disease-states. This way we will not loose hundreds of cultures isolated from different laboratories throughout India that are otherwise lost after one or two analyses in the screening programmes in their respective laboratories or, quite often than not, never taken up for any screening programmes other than biodiversity analyses. Similarly extracts of microorganisms that show negative results in antimicrobial screening may show positive result in other aspects for e.g., antidiabetic or anticancer properties. But, since, many laboratories have facilities only for any one particular screening programme they are discarded when they show negative results for one particular trait without realizing that they may show a positive result in another trait. The present suggestion for nodal centre stems from these arguments for a wholesome screening programme without losing the cultures. Since, now-a-days, high throughput screening techniques are available to screen a vast number of extracts, the nodal centre should be well-equipped with high throughput screening methods/tools with automation wherever possible.

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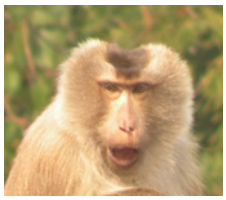
Bamboo invasion: threat to primate conservation in North East India

Bamboo (Poaceae: Bambuseae) dominates the forests in India as wet, moist and secondary moist bamboo brakes[1] and contributes as much as 12% of total natural forest resource of North East (NE) India[2]. With fast growth rate and clonal reproduction[3], bamboos can rapidly invade forest areas, drastically changing their original structure[4]. Several woody bamboos are typical examples of invasive plants, having many characteristics of successful invaders[5]. Once established, fast growth and clonal reproduction increase the ability of bamboos to compete for space and to form dense stands[6]. Since woody bamboos are essentially forest species[7], bamboo-dominated areas usually play an important part in the structure and dynamics of forest ecosystems[8]. Thus, there is a general agreement that bamboos compete with other species, reducing woody species density and diversity[6], and sometimes bringing forest succession to a standstill[9]. Bamboos also affect seed dispersal patterns, influencing forest regeneration in the early stages[10]. Unconstrained bamboo expansion can lead to the formation of the so-called bamboo forests, well-known in eastern Asia[11].

The present study was carried out in Trishna Wildlife Sanctuary (TWS), Tripura, NE India, covering an area of ~200 sq. km and home to five globally threatened primate species. Data on CITES and IUCN Red List status of primates of TWS are provided in Table 1. Forest areas dominated by trees are important for foraging and other life-support requirements of the primates[12]. *Aglaia edulis*, *Albizia procera*, *Aphanamixis polystachya*, *Artocarpus chama*, *Artocarpus lakoocha*, *Baccaurea ramiflora*, *Bombax ceiba*, *Bridelia retusa*, *Castanopsis indica*, *Derris robusta*, *Dillenia indica*, *Dillenia pentagyna*, *Diospyros* sp., *Dysoxylum procerum*, *Elaeocarpus* sp., *Eugenia* sp., *Engelhardia spicata*, *Ficus* sp., *Careya arborea*, *Ptereospermum* sp., *Sterculia* sp., *Syzygium* sp., *Terminalia* sp., *Tonna ciliate*, *Vitex* sp. and *Ziziphus* sp. are found to be important for foraging of primates in this region[13,14], and therefore, the

Table 1. Primate species of Trishna Wildlife Sanctuary and their global conservation status

Scientific Name	Common name	Status	Status	Photograph
Trachypithecus phayrei (Blyth, 1847)	Phayre's Leaf-monkey	II	ENDANGERED EN A2cd ver 3.1	
Trachypithecus pileatus (Blyth, 1843)	Capped Langur	I	VULNERABLE VU A2cd+3cd ver 3.1	
Macaca nemestrina (Linnaeus, 1766)	Southern Pig-tailed Macaque	II	VULNERABLE VU A2cd ver 3.1	
Hoolock hoolock (Harlan, 1834)	Western Hoolock Gibbon	I	ENDANGERED EN A2acd+3cd+4acd ver 3.1	
Nycticebus bengalensis (Lacépède, 1800)	Bengal Slow Loris	I	VULNERABLE VU A2acd+3cd+4acd ver 3.1	

availability of these food trees can be the limiting factor for primate survival[15]. Primates prefer a wide range of food and in the broader sense, in accordance with their preference, this can be represented as: (i) leaves (40–50%), (ii) gums and flowers (20–35%), and (iii) fruits, seeds, petioles (10–35%) of different tree species[14,16,17]. Besides fulfilling the food requirement of primates, trees are also the suitable sites for resting, sleeping and protection from hunter or predators. Hence, the survival of these primate species depends on the continued availability of such trees[18].

Melocanna baccifera locally called 'Muli' is the most dominant species of bamboo in the forests of Tripura[19]. It flowered gregariously during 2004–08, and subsequently set seed and died. It is a non-clump forming bamboo, culms diffused in the clump, is an early colonizer and often forms the dominant vegetation in the tropical and subtropical hill slopes on which it grows[20]. Recent studies from NE India have shown the successful regeneration of the species after gregarious flowering with stand density as high as 40,000–50,000 culms ha^{-1} (ref. 21). The species flowered gregariously in TWS during 2007–08 and regenerated successfully (Figure 1) with very high stand density (40,000–45,000 culms ha^{-1}) (unpublished). During a recent field visit to TWS, it was observed that forest gaps developed through degradation have

Figure 1. Bamboo invasion in the core area of Trishna Wildlife Sanctuary, Tripura, North East India.

been invaded by *M. baccifera*. It was also observed that only few seedling and saplings surviving in the forest gap that have been invaded by *M. baccifera*. In the absence of woody tree species regeneration, this area can develop into a bamboo forest. From a dietary point of view, a bamboo-dominated forest cannot provide foraging requirements of the primates. Moreover, in the absence of adequate number of trees, their activity can also be hampered. In a recent study from the lowland tropical wet forests of Costa Rica, reduction in the primate population was reported in the absence of adequate woody trees[12]. Therefore, the need of the hour is to control the existing and stop further bamboo invasion in TSW to conserve the globally threatened primate species. We propose two strategies to control bamboo invasion: (i) clear felling in heavily dominated bamboo sites and to plant primate preferred tree seedlings, and (ii) develop selective felling in a five-year cycle to control further bamboo invasion and for sustainable utilization of existing bamboo resources.

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