

Growth of biotechnology

The commentary by G. Padmanaban¹ is a well balanced and realistic assessment and perhaps the first authentic write-up on the subject. While it is encouraging to learn that India has crossed the lag phase of growth, too much of hype is detrimental for the development of technology. While some hype is necessary, too much publicity raises unrealistic expectations. As the author has rightly pointed out, students are

falling for BT all over the country and unscrupulous elements are out to make a quick buck. This will have a backlash, when students and their parents find out that BT is not the same as IT in terms of job opportunities. I also totally agree with the author that India should aim for global leadership in the area of vaccines. *Current Science* should continue to publish such highly informative and authoritative articles.

1. Padmanaban, G., *Curr. Sci.*, 2003, **85**, 712–719.

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Sacred groves of Dakshina Kannada and Udupi districts of Karnataka

Pieces of vegetation existing at present as a consequence of religious refugia offered to them are called sacred groves. Sacred groves occur in India and in other parts of Asia and Africa. In India, about 13,720 sacred groves have been enumerated so far from 19 states¹. In South India, about 2000 groves occur in Kerala², 1600 in Maharashtra³, 800 in Andhra Pradesh⁴, and 448 in Tamil Nadu⁵. Extensive studies on the sacred groves of Maharashtra^{6,7} and Kerala^{8–10} have indicated that they are rich in rare and endemic species of plants. A new species of plant, *Kunstleria keralensis* was reported from a sacred grove of southern Kerala⁹.

From Karnataka, sacred groves have been reported from the districts of Uttara Kannada¹¹, Shimoga¹² and Kodagu¹³. The natural populations of *Vateria indica* L., a dipterocarp endemic to the Western Ghats occur only in a couple of *kans* or sacred groves of Uttara Kannada and Shimoga¹⁴. Kodagu district has 1214 sacred groves covering an area of 2550.45 ha (ref. 13). A comparative study of these sacred groves with the adjoining reserve forests and coffee plantations revealed that about 14% of tree species, 26% of bird species and 44% of fungal morphotypes are exclusive to sacred groves¹⁵.

It is surprising to note that sacred groves have not been properly documented from Dakshina Kannada and Udupi districts of Karnataka, where a network of numerous sacred groves occurs even today, dotting the otherwise deforested

landscapes of the coastal and plateau regions. Their past magnitude can be visualized by an indirect mention made by Gadgil in one of his articles that 'One can see that the sacred groves formed islands of climax vegetation at densities of 2 to 3 per km², ranging in size from a small clump to a hectare or more and originally covering about 5% of the land area', which is based on a personal communication of late Shivaram Karanth¹⁶. These groves are locally called *banas*, majority of which are dedicated to the serpent god Naga. A few are also attached to some of the other locally worshipped spirits or *Bhutas* such as Guliga, Kallurti, Bhairava, Raktheshwari and others. Unlike the *Devara kadus* and *kans*

of the neighbouring districts, which are usually the common heritage of a village or community, *banas* usually belong to individual families of traditional land-owning castes. A few or at least one *bana* existed in the land owned by almost every agricultural family. In many cases, *banas* dedicated to different deities are seen together as a cluster. They, however, are smaller in size and rarely extend beyond an acre.

Floristically, the *banas* are the last shelters of natural forests in the coastal and plateau parts of these districts. They are also the indicators of the rich vegetation that had existed here in the past, which has now been replaced by paddy fields and plantations. The species of

Table 1. Some species of plants (along with family name/life form/common names) commonly found in the sacred groves of Dakshina Kannada and Udupi districts which are endemic to Peninsular India/the Western Ghats of India

<i>Artocarpus hirsutus</i> Lam./Moraceae/tree/Hebbalasu
<i>Dalbergia horrida</i> (Dennst.) Mabb./Papilionaceae/climber/Parantolu
<i>Garcinia indica</i> (Thouars) Choisy/Guttiferae/tree/Murgalu, Punarpuli
<i>Gymnostachyum febrifugum</i> Benth./Acanthaceae/herb/Nela muchiru
<i>Holigarna ferruginea</i> Marchand/Anacardiaceae/tree/Holegeru, Chere
<i>Hopea parviflora</i> Beddome/Dipterocarpaceae/tree/Karimara
<i>Hopea ponga</i> (Dennst.) Mabb./Dipterocarpaceae/tree/Karimara
<i>Hydnocarpus pentandra</i> (Buch-Ham.) Oken/Flacourtiaceae/tree/Soorante
<i>Ixora brachiata</i> Roxb./Rubiaceae/tree
<i>Jasminum malabaricum</i> Wight/Oleaceae/climber/Kadu mallige
<i>Memecylon malabaricum</i> (C. B. Clarke) Cogn./Melastomataceae/shrub/Ollekodi
<i>Mussaenda belilla</i> Buch.-Ham./Rubiaceae/climber/Bellate, Bolle tappu
<i>Psychotria dalzellii</i> Hook. f./Rubiaceae/shrub/Bili kepula
<i>Tabernaemontana heyneana</i> Wallich/Apocynaceae/tree/Kokkekai
<i>Vateria indica</i> L./Dipterocarpaceae/tree/Dhoopa

plants occurring in the *banas* are diverse, and they are strikingly different from those few that occur in their surrounding areas. A preliminary survey has revealed that they are also rich in endemics. Table 1 provides only a few of the frequently found and easily recognized species of plants of the *banas* which are reported to be endemic to Peninsular India and the Western Ghats¹⁷. Lianas like *Calycopteris floribunda* Lam., *Hippocratea indica* Willd., *Strychnos* spp., *Alangium salvifolium* (L.f.) Wangerin, *Gnetum ula* Brongn., etc. of stunning girth abound only in the *banas* because, when found growing in open areas, they are harvested by the locals for weaving baskets. Besides, the *banas* are also the repository of germplasm of wild yams (*Dioscorea* spp.), pepper (*Piper* spp.), mango (*Mangifera indica* L.) and a variety of medicinal and fruit-yielding plants.

The present status of sacred groves is a matter of deep concern as they are on a path of gradual decline and disappearance, thanks to various socio-economic factors. Their presence in the agricultural lands, fragmentation of the grove-owning families and loosening belief of the younger generation on the deities and associated traditions are the major reasons. In addition, of late, a modern method of re-

juvenation of *banas* by constructing grand concrete shrines in places of former symbolic worship stones, is also ruining the valuable vegetation protected in the *banas*. The area is cleared and large trees are felled with no regard (Figure 1), to accommodate the new concrete structures; a part of the expenditure is also met with by selling the trees as timber! In the background of these happenings, there is fear that the vestigial *banas* will meet their silent death without leaving behind even a record of the precious species they contained! Immediate attempts are therefore needed to scientifically document and explore them, which should be followed by actions such as creating awareness about their socio-biological significance, support for fencing, discouraging modernization of the deities, ban on tree-felling in the *banas*, amelioration of partially degraded *banas*, etc. to ensure their long term conservation.



Figure 1. Remnant patch of a sacred grove of Puttur Taluk, Dakshina Kannada District. Note the totally devastated foreground.

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