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We welcome the readers of Van Sangyan to write to us about their views and issues in forestry. Those who wish to share their knowledge and experiences can send them:

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The articles can be in English, Hindi, Marathi, Chhattisgarhi and Oriya, and should contain the writers name, designation and full postal address, including e-mail id and contact number. TFRI, Jabalpur houses experts from all fields of forestry who would be happy to answer reader's queries on various scientific issues. Your queries may be sent to The Editor, and the expert's reply to the same will be published in the next issue of Van Sangyan.

**Cover Photo: Panoramic view of Achanakmar-Amarkantak Biosphere Reserve**

**Photo credit: Dr. N. Roychoudhury and Dr. Rajesh Kumar Mishra, TFRI, Jabalpur (M.P.)**

**From the Editor's desk**

*Fungi hold key roles in nutrient dynamics, soil health, species mutualisms and interactions, and overall ecosystem processes. However, despite their functional importance, they are often overlooked and left out of conservation initiatives. Fungal biodiversity worldwide has been estimated at over 1.5 million (Hawksworth 2001), i.e. about six–seven times the number of known plant species. Yet, only about 5-10% of fungal species have been discovered and described. At the regional scale climatic conditions, tree species composition have been identified as important variables influencing species diversity and community structure.*

*Macrofungi are cosmopolitan, heterotrophic organisms that are quite specific in their nutritional and ecological requirements. Macrofungi occupy important place in the biodiversity of India. Macrofungi (also called mushrooms) are represented by 41,000 species across the globe out of which only ~2% have been reported from India, despite the fact that one-third of the total global fungal diversity exists in the tropical Indian region (Priyamvada et al. 2017). Many Asian countries use traditionally wild edible mushrooms as delicious and nutritional food and medicine. Wild edible macrofungi are appreciated not only for texture and flavour but also for their chemical and nutritional characteristics.*

*In line with the above this issue of Van Sangyan contains an article on Diversity of macro-fungi in Central India-XVII: *Geastrum fimbriatum* and *Geastrum triplex*, There are other useful articles viz. Vital role of agro-forestry systems for livestock feed, Forest generations (tribes), Diversity of macro-fungi in Central India-XVIII: *Cookeina tricholoma*, a cup fungus from Maharashtra, अमरबेल: एक खरपतवार या महत्वपूर्ण परजीवी पौधा and Know your biodiversity: *Aconitum heterophyllum* and *Moschus leucogaster*.*

*I hope that readers would find maximum information in this issue relevant and valuable to the sustainable management of forests. Van Sangyan welcomes articles, views and queries on various such issues in the field of forest science.*

*Looking forward to meet you all through forthcoming issues*

**Dr. R. K. Verma**  
Scientist 'G' & Chief Editor

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## Diversity of macro-fungi in Central India-XVII: *Geastrum fimbriatum* and *Geastrum triplex*

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### Abstract

In the present article data on 24 species of *Geastrum* were compiled with their habit, distribution and references. Two species namely, *Geastrum fimbriatum* and *G. triplex* were described from central India (Jabalpur, Madhya Pradesh). *G. fimbriatum* constitute a new record from central India. These two species grow on ground during monsoon period (June-September) and also reported from Himachal Pradesh and Uttarakhand.

### Introduction

Genus *Geastrum* (orthographical variant *Geaster*) belong to family Geastraceae. Many species are known commonly as earthstars. The name refers to the behavior of the outer peridium, which on maturity splits into segments turning outward creating a star-like pattern on the ground. The inner peridium is a spore sack. In some species, the outer peridium splits from a middle layer, causing the spore sack to arch off the ground and is hygroscopic that is it opens when wet and closes when dry. Generally the genus *Geastrum* is believed to be saprotrophic with an exception of one published record from Germany indicating a mycorrhizal connection between *G. fimbriatum* and *Fagus sylvatica* (Agerer and Beenken, 1998). Although species of geasters were recorded from moist-deciduous forests, semi-evergreen forests, sacred groves and coffee plantations of the Western Ghats of

Karnataka and Kerala. They were reported from coffee agroforestry, sacred groves and Shola forests in the Western Ghats. They are usually terrestrial, rarely lignicolous or coprophilous (Bhagwat et al., 2005; Mohanan, 2011). Geasters were also reported from leaf litter and humus, decomposing twigs or bark of *Pongamia*, *Acacia auriculiformis* and decaying twigs of *Sapium insigne* (Karun and Sridhar, 2014). Recently many macro-fungi from central India have been reported including some edible, ectomycorrhizal, saprophytic mushrooms, puff balls, *Amanita* and *Russula* spp. (Verma and Pandro, 2018a,b,c; Verma et al., 2016a,b; 2017a,b,c; 2018a,b,c) but only *G. triplex* reported from central India (Sharma et al., 2009).

In the present article two species of the genus namely, *Geastrum fimbriatum* and *G. triplex* were described. *G. fimbriatum* constitutes a new record from central India. In addition, 25 species of *Geastrum* were compiled with their habit, distribution and references.

### Materials and methods

Specimens were collected from Amarkantak and Jabalpur, Madhya Pradesh, India. Identification of fungi were done with the help of literature (Baseia et al. 2003; Bottomley, 1948; Cunningham, 1942; De Roman, 2010; Dörfelt et al., 2004; Gogoi and Vipin, 2015; Gupta et al.,

1974; Junghuhn, 1840; Karun and Sridhar, 2014; Khare, 1976a; Klotzsch, 1832; Pegler et al., 1995; Rao Anand, 1964; Roody, 2003; Sohi et al., 1964; Thind and Thind, 1982; Thind et al., 1984; Tiwari et al., 2013) and matter available on net. The slides were prepared in lactophenol and cotton blue and observed under advance Research Microscope, make Leica, Germany and photomicrographs were taken with a digital camera attached to the microscope. Species reported from India were compiled (Tabel 1 and Fig. 9). The specimens were deposited in the Mycology Herbarium, Tropical Forest Research Institute, Jabalpur and got accession numbers.

## Results

### Taxonomic description:

**1. *Geastrum fimbriatum* Fr. (Figures 1-5)**  
(Geastraceae, Geastrales, Phallomycetidae, Agaricomycetes, Agaricomycotina, Basidiomycota)

### Synonymy:

=*Geastrum rufescens* var. *minor* Pers.  
=*Geastrum tunicatum* Vittad var. *tunicatum*  
=*Geastrum fimbriatum* f. *pallidum* A.H. Sm.  
=*Geastrum fimbriatum* var. *melanocyclum*  
Dörfelt =*Geastrum fimbriatum* var.  
*pseudohieronimii* Calonge & M. Mata

=*Lycoperdon sessile* Sowerby  
=*Geastrum sessile* (Sowerby) Pouzar  
=*Geastrum fimbriatum* Fr. var. *fimbriatum*  
=*Geastrum tunicatum* Vittad.

The cap resemble like a sported flower, the fruit body is creamy orange, scaly, bulb-shaped, sessile, up to 1cm high and 3-4cm in diam. Basidiome when young onion shaped, outer wall dark brown, at maturity split into 7-8 equal narrow, pointed lobes and then 3-7cm in diam. the lobes are deeply saccate at the base, soft, flesh felted, spongy, spore sac subtended by a thick sessile, 1-2cm diam. pale yellowish, smooth to somewhat grooved, peristome conical, projecting, silky surrounded at base by a wide, smooth, depressed zone. Basidiospores are spherical 4-5 $\mu$ m in diam. roughened by many small points or warts, dark brown, spiny. The capillitium is thick-walled, un-branched and 4-7 $\mu$ m thick. *G. saccatum* is distinguished from other earthstars by the distinct circular ridge or depression surrounding the central pore.

**Collection examined:** Under gulmohar tree, TFRI campus, Jabalpur 19/7/2018, specimen deposited in Mycology Herbarium, Tropical Forest Research Institute, Jabalpur TF 4050.



**Figs. 1-2: *Geastrum fimbriatum*, 1 fruit bodies in habit, 2 enlarge view in habit**





Fig. 3: *Geastrum fimbriatum*, collected from 28/08/2012, Balaghat, Madhya Pradesh



Fig. 4: *Geastrum fimbriatum*, different stages of growth (from left to right un-open hypogeous fruit body; start opening of wings and fully open fruit body)



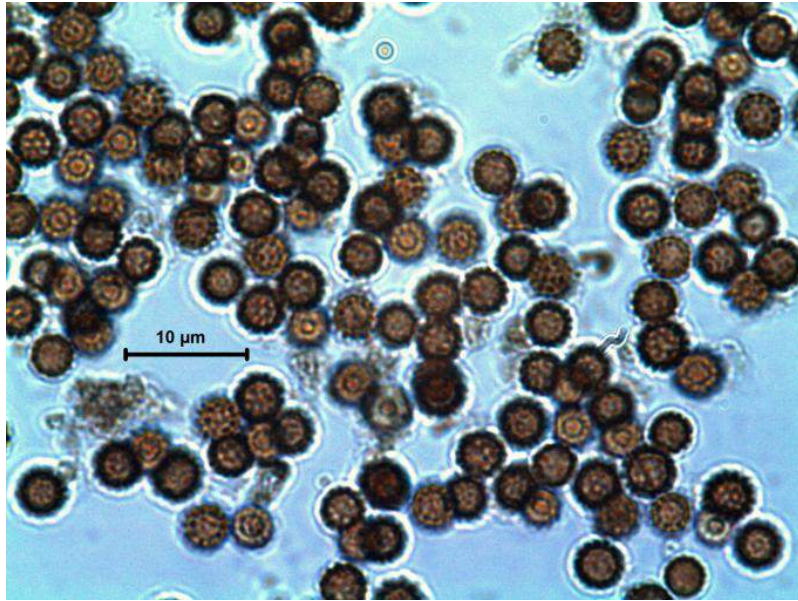


Fig. 5: *Geastrum fimbriatum*: basidiospores

## 2. *Geastrum triplex* Jungh. (Figures 6-8)

### Synonymy:

=*Geastrum triplex* Jungh. f. *triplex*  
 =*Geastrum tunicatum* var. *michelianum* Sacc.  
 =*Geastrum michelianum* (Sacc.) W.G. Sm.  
 =*Geastrum triplex* f. *pedicellatum* V.J. Staněk  
 =*Geastrum triplex* f. *roseum* V.J. Staněk,  
 Sporophore star shaped, 2-3, epigeous.  
 Exoperidium rough 1.5-2.0mm thick  
 rough, break up outwardly to form 5-8  
 expanded arms (rays) 2-6cm across. Rays  
 fleshy, glabrous and flame shaped  
 narrower at tip than base white to umber  
 when fresh and brown to black colored

usually marked with numerous  
 longitudinal striation, base plane with a  
 prominent umbilical scar. Endoperidium  
 elevated thin 0.5-1.0mm, soft, umber to  
 bay brown in colour, with an apical pore at  
 centre to release spore in air. Gleba dark  
 brown to almost black, furfurious, contains  
 millions of spore. Basidiospores are  
 olivaceous to dark brown, globose,  
 prominently verrucose and 4-5μm in diam.  
**Collection examined:** Growing under  
*Shorea robusta* in sal forest, Amarkantak,  
 Madhya Pradesh, 28/07/2010.



Fig. 6: *Geastrum triplex*: A single sporophore in natural habitat



Fig. 7: *Geastrum triplex*: different stages of development of sporophore

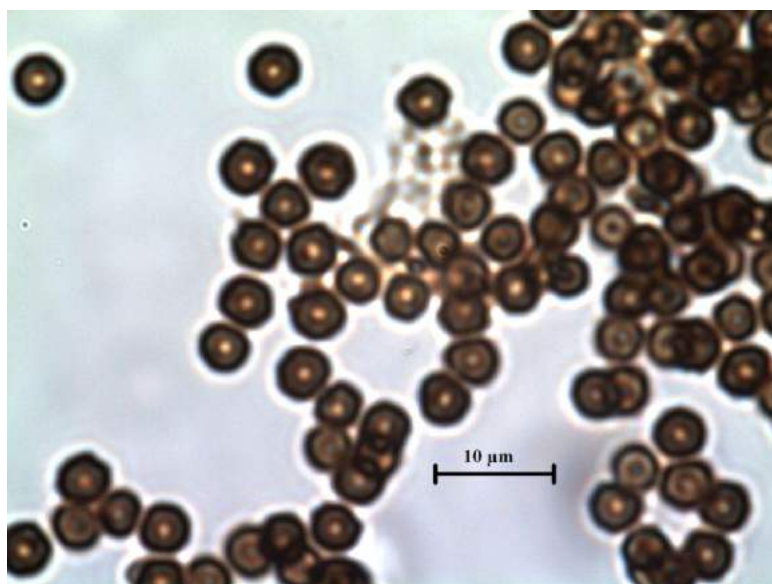


Fig. 8 *Geastrum triplex*: basidiospores

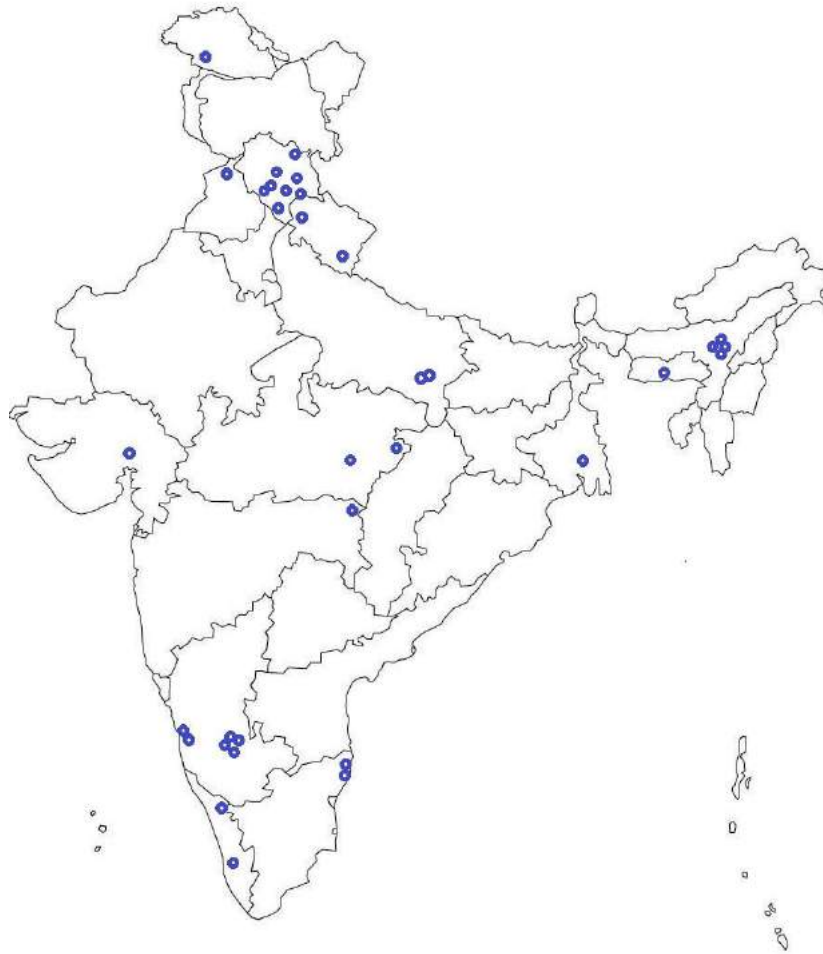
Table 1: *Geastrum* species reported from India

SN	Name of fungus	Habit	Distribution	Reference
1.	<i>Geastrum archeri</i> Berk.	on soil	Nainital, Uttarakhand	Khare (1976a)
2.	<i>Geastrum arenarium</i> Lloyd	on soil	Solan, Himachal Pradesh	Gupta et al. (1974)
3.	<i>Geastrum clelandii</i> Lloyd	on ground	Jalori pass, Himachal Pradesh	Cunningham (1942)
4.	<i>Geastrum congolense</i> Dissing & M. Lange	on decaying leaves of teak and humicolous soil	Meghalaya	Thind et al.(1984)

5.	<i>Geastrum coronatum</i> Pers.	Dead bamboo stump	Jorhat, Assam	Gogoi and Vipin (2015)
6.	<i>Geastrum fimbriatum</i> Fr.	on ground	Himachal Pradesh, Kodagu, Karnataka, Jabalpur, Madhya Pradesh	Cunningham (1942); (Karun and Sridhar (2014); This article
7.	<i>Geastrum floriforme</i> Vittad.	on sandy soil	Gopalpur forest area, Himachal Pradesh	Sohi et al. (1964)
8.	<i>Geastrum indicum</i> (Klotzsch) Rauschert ≡ <i>Cycloderma indicum</i> Klotzsch	on ground	India	Klotzsch (1832)
9.	<i>Geastrum lageniforme</i> Vittad.	on soil with decaying twigs and bark of <i>Pongamia</i> <i>pinnata</i>	Mangalore, Karnataka	Karun and Sridhar (2014)
10.	<i>Geastrum limbatum</i> Fr.	on soil	Nichar, Himachal Pradesh	Cunningham (1942)
11.	<i>Geastrum lloydianum</i> Rick	Bamboo leaf litter	Jorhat, Assam	Gogoi and Vipin (2015)
12.	<i>Geastrum ammosum</i> Chevall.	on ground	Jalori pass, Himachal Pradesh	Bottomley (1948)
13.	<i>Geastrum minimum</i> Schwein.	on moist humicolous soil and sand	Srinagar, Jammu and Kashmir	Thind et al. (1984)
14.	<i>Geastrum minus</i> (Pers.) G. Cunn.	on ground	Gurdaspur Punjab	Cunningham (1942)
15.	<i>Geastrum morgani</i> Lloyd	on soil in forest areas	Mashobra, Himachal Pradesh	Sohi et al. (1964)
16.	<i>Geastrum pectinatum</i> Pers.	on ground	Chennai Tamil Nadu	Bottomley (1948)
17.	<i>Geastrum</i> <i>pseudostriatum</i> Hollós	On soil with litter of <i>Canarium</i> <i>strictum</i> and <i>Dysoxylum</i> <i>malabaricum</i>	Kodagu, Karnataka	Karun and Sridhar (2014)
18.	<i>Geastrum quadrifidum</i> DC. ex Pers.	on soil	India	Bottomley (1948); Zamora et al. (2015)
19.	<i>Geastrum saccatum</i> Fr.	on soil;	Maninagar,	RaoAnand



		<i>Canarium strictum</i> , <i>Dysoxylum malabaricum</i> and <i>Holigarna nigra</i> ; bamboo leaf litter	Ahmedabad, Gujarat and Varanasi, Uttar Pradesh, Kodagu, Karnataka; Jorhat Assam	(1964); Khare (1976a); Karun and Sridhar (2014); Gogoi and Vipin (2015)
20.	<i>Geastrum schweinitzii</i> (Berk. & M.A. Curtis) Zeller $\equiv$ <i>Coilomyces</i> <i>schweinitzii</i> Berk. & M.A. Curtis = <i>Geastrum</i> <i>stipitatum</i> Solms	on soil; on debris of <i>Acacia</i> <i>auriculiformis</i> , <i>Sapium insigne</i> and cashew; bamboo leaf litter	Varanasi, Uttar Pradesh; Kodagu and Mangalore, Karnataka and Jorhat, Assam	Khare (1976a); Karun and Sridhar (2014); Gogoi and Vipin (2015)
21.	<i>Geastrum simulans</i> Lloyd	on ground	Rohtang pass, Himalayas, Himachal Pradesh	Cunningham (1942)
22.	<i>Geastrum striatum</i> DC.	on ground	Bagheda, Amagoan, Gondia, Maharashtra	Bhuskute et al. (2018)
23.	<i>Geastrum subiculosum</i> Cooke & Masee	on ground under <i>Casuarina</i> tree	Kolkata, West Bengal	Cunningham (1942)
24.	<i>Geastrum triplex</i> Jungh.	on the ground; <i>Terminalia</i> <i>paniculata</i> , <i>Artocarpus</i> <i>heterophyllus</i> , <i>Canarium</i> <i>strictum</i> and <i>Mangifera</i> <i>indica</i>	Mussoorie, Uttarakhand; Kerala; Amarkantak, Madhya Pradesh	Butler and Bisby (1931); (Karun and Sridhar (2014); Mohanan (2011); This article



**Fig. 9:** Distribution of *Geastrum* spp. in India

### Discussion

Elias Magnus Fries described *Geastrum fimbriatum*, 'as *Geaster fimbriatus*' (Fries 1829) '*fimbriatum*' means "fringed", referring to the characteristic spore sac. The fruit bodies are roughly spherical and hypogeous. When they matures it pushed up through the soil and the other layer of the spore case (exoperidium) splits open to form between 5 and 8 rays (commonly 7) that curve downward. Before expansion, the outer surface has a cottony surface with adherent soil particles; this ultimately peels off to reveal a smooth, grayish-brown surface. The fruit bodies have no distinctive taste or odor. *G. fimbriatum* is similar to *G. saccatum* but this species has larger – up to 5 cm across and has a clearly delimited ring-like area around the pore

opening. Although it was listed in field guides as an inedible species (Roody, 2003) but it was reported to be eaten by the tribal peoples of Madhya Pradesh (De Roman, 2010). The species commonly grows on soil (frequently on calcareous and humus soil) in deciduous woodland or conifers and rarely in coastal scrub. It is reported growing on soil along with mixed leaf litter of *Artocarpus heterophyllus*, *Coffea robusta* and *Mangifera indica* in coffee agroforestry at Kodagu, Karnataka (Karun and Sridhar, 2014). Roots of *Abies pindrow*, *Cedrus deodara*, *Pinus wallichiana* and *P. roxburghii* were associated with *G. fimbriatum* at Dehra Dun (Bakshi, 1974). This geaster was ectomycorrhizal with *Shorea robusta* in tropical moist deciduous forests in Madhya

Pradesh, central India (Sharma et al., 2009). Other hosts of *G. fimbriatum* includes: *Acer pseudoplatanus*, *Alnus*, *Carpinus*, *Corylus*, *Crataegus*, *Fagus*, *Fraxinus*, *Populus tremula* and *Prunus avium* or with conifers such as *Cedrus*, *Cupressus*, *Larix*, *Picea*, *Pinus*, *Sequoia* spp. and *Taxus*, *Quercus* and rarely in coastal scrub, with *Hippophaë amnoides*, on dunes, in hedgerows, gardens and rather frequently with *Urtica dioica*. *G. fimbriatum* is commonly known as the fringed earthstar. It is a sessile earthstar which is an inedible species of mushroom. This species has a widespread distribution and is found in Asia, Europe, and the Americas. It is distinguished from other earthstars by the delicate fibers that line the circular pore at the top of spore sac. *G. fimbriatum* is distributed in Asia (India and Vietnam), Europe (Portugal), and the Americas (Brazil, Costa Rica and Michigan). *Geastrum triplex* is distributed in Central India, Java and East Indies. *G. fimbriatum* was reported earlier growing on the ground from Himachal Pradesh (Cunningham, 1942) while *Geastrum triplex* was reported from Mussoorie, Uttarakhand (Butler and Bisby, 1931). *G. triplex* is common in humus accumulated moist forest floor in the vicinity of *Terminalia paniculata* with thick canopy cover especially during mid rainy season (August). It was found close to the tree bases of *Artocarpus heterophyllus*, *Canarium strictum* and *Mangifera indica*. It was also reported to be ectomycorrhizal with sal trees in tropical moist deciduous forest in Madhya Pradesh (Sharma et al, 2009). Further studies are needed to confirm its ectomycorrhizal association with different host tree species.

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## Vital role of agro-forestry systems for livestock feed

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### Abstract

In Indian agriculture, livestock plays a pivotal role in the development and progress of mankind with crop production program as a complementary enterprise. However, livestock productivity is constrained by an acute shortage of feed and fodder. A general agreement is that there is a shortage of 63.5% green fodder and 23.5% dry fodder against the requirement of 1097 and 609 million tons (Mt) for green and dry fodder, respectively. In India, there is a deficit of green fodder, particularly during the summer season. In India, only 4.4% of the cultivated area is under fodder crops with annual total forage production of 846 Mt. Besides having several benefits, agro forestry is an important source of fodder. Diversification of land use systems with agro forestry is a necessary strategy for providing a variety of products for meeting requirements of the people, insurance against risks caused by weather aberrations, controlling erosion hazards, and ensuring sustainable production on a long-term basis.

**Keywords** - Agro forestry, green fodder, silvi-pastoral System

### Introduction

India is basically an agricultural country and nearly three-fourth population depends on agriculture, livestock and allied sectors for livelihood. Nearly 70 % of country's population lives in rural areas. Furthermore, of the 40.7 crore poor in the country, about 80% are rural poor. Livestock is a key source of

supplementary income and livelihood especially for small land holders and landless rural poor households. Traditionally, in India, agriculture and livestock are intertwined in such a manner that it ensures sustainable livelihood to a large proportion of rural population even during sub-normal rainfall / scarcity years. Livestock is also an important asset for them which provide employment to millions of rural people. Rapid growth of livestock sector is therefore most desirable not only to sustain steady agriculture growth but also to reduce rural poverty especially when a majority of land holders are less than 2 hectares and about 30% of rural households are landless. Although India has very large population of livestock, the productivity of milk and other livestock products per animal is very low compared to other many countries in the world. One of the main reasons for the low productivity of our livestock is malnutrition, under-nutrition or both, beside the low genetic potential of the animals. The adequate supply of nutritive fodder and feed is a crucial factor impacting the productivity and performance of the animals. The country is highly deficient in respect of availability of green fodder, dry fodder and concentrates. Fodder deficit can mainly be attributed to our limitations in increasing the area under fodder crops, limited availability of good high yielding fodder varieties, lack of quality seeds of improved hybrids/ varieties, poor quality of dry fodder like paddy/wheat straw, changing



crop pattern in favor of cash crops etc. Besides, low priority accorded to investment in fodder production, lack of post-harvest management for surplus fodder, poor management of grazing/pasture lands and inadequate research, extension and manpower support also aggravated the shortfall situation of fodders. Future development and growth of livestock are highly associated with the scope of availability of fodder from cultivable land, forest, pastures and

grazing lands. Therefore, it is important to put more emphasis on fodder development programmes for augmenting fodder /feed supply, while formulation of livestock development strategy. Scenario of Feed and Fodder Availability and Future Requirement There is tremendous pressure of livestock on available feed and fodder, as land available for fodder production has been decreasing. Scenario of feed and fodder availability till 2025 is as below.

**Table 1:** Scenario of Feed and Fodder Availability and Future Requirement (in million tonnes)

Year	Supply (In million tonnes)		Demand (In million tonnes)		Deficit as % of demand (actual demand)	
	Green	Dry	Green	Dry	Green	Dry
1995	379.3	421	947	526	59.95 (568)	19.95 (105)
2000	384.5	428	988	549	61.10 (604)	21.93 (121)
2005	389.9	443	1025	569	61.96 (635)	22.08 (126)
2010	395.2	451	1061	589	62.76 (666)	23.46 (138)
2015	400.6	466	1097	609	63.50(696)	23.56 (143)
2020	405.9	473	1134	630	64.21(728)	24.81(157)
2025	411.30	488	1170	650	64.87(759)	24.92(162)

**Source:** Report of the working group on Animal Husbandry and dairying for the Eleventh Five year Plan (2007-2012), Planning Commission, Government of India.

It is obvious from table 1 that deficit in green and dry fodder is increasing every year. However, this gap is critical and is going to determine the type of animals and husbandry practices to be followed. Scarcity of feed and fodder resources (both quantity and quality), low production potential of animals, non-availability of critical inputs or services in time along with access to capital and markets, are primary reasons for low productivity of dairy animals (Mishra et al., 2009). Agro forestry: Concept and Definition Agro forestry is not a new system or concept. The practice is very old, but the term is definitely new. Agro forestry means practice of agriculture and forestry on the

same piece of land. Bene et al. (1977) defined agro forestry as a sustainable management system for land that increases overall production, combines agricultural crops and animals simultaneously. Nair (1979) defines agro forestry as a land use system that integrates trees, crops and animals in a way that is scientifically sound, ecologically desirable, practically feasible and socially acceptable to the farmers. Another widely used definition given by the International Center for Research in Agro forestry (ICRAF) Nairobi, Kenya, that, "agro forestry is a collective name for all land use systems and practices where woody perennials are deliberately grown on the same land

management unit as agricultural crops or animals in some form of spatial arrangement or temporal sequence" (Nair, 1993).

### **Agro forestry models for fodder production**

- Silvi-pastoral System
- Agri-silvipastoral system
- Agri-horti-silvicultural system
- Horti-pastoral system

#### **Silvi-pastoral System**

Silvi-pasture implies sustained and combined management of the same land for herbaceous fodder, top feeds and fuel wood, thereby leading to optimization of production. Himalayan rangelands exhibited enormous gain in forage production over existing situation due to multi-tier silvi-pasture techniques amalgamated with an adaptable complementary plant species. Silvi-pastoral systems are most important for increasing fodder production from marginal, sub-marginal and other wastelands. It comprises about 50 % of total land area. It involves planting of multipurpose trees in existing pastures/ grazing lands or planting such trees on wasteland/ denuded lands followed by sowing/ planting of grasses and or legumes in between the inter-spaces of trees. Atul (1996) obtained 5-7 t/ha green fodder under silvipastoral system, where as it was only 3-4 t/ha without a tree component. Sharma and Koranne (1988) found that maximum production of 300 g/m<sup>2</sup> /annum under existing grasslands, while under modified network of silvipastoral system of *Digitaria decumbens* + *Bauhinia pupurea* / *Quercus incana* / *Grewia optiva* / *Celtis australis* production varied from 1800- 2450 g/m<sup>2</sup> /annum.

#### **Adoption of Agri-silvipastoral system**

Under agri-silvicultural system multipurpose trees including fodder cum fuel trees can be grown in association with crops. Trees are pruned annually, yielding fodder as well as fuel wood. In addition to 9 annual pruning, few trees are also cut down in order to allow light penetration and minimization of competition with the crops. Under alley cropping system multipurpose trees like *Leucaena leucocephala* and even perennial pigeon pea etc. are pruned frequently to provide leaf fodder to get better crop production.

#### **Agri-horti-silvicultural system**

Under this system besides growing fruit trees and fodder crops, fast growing NFTs like *Leucaena leucocephala* can be lopped two to three times in a year to provide fodder (2.5-3.0 t/ha) and fuel wood (1.8-2.5 t/ha). These fodder trees also provide some protection to fruit trees during summer and cold winters.

#### **Horti-pastoral system**

In this system forage are grown in wide inter-row spaces of fruit trees for economic utilization of orchard lands. Horti-pasture up to an elevation of 2000 m is catching up with the orchardist. Forage from horti-pasture is consumed fresh and is also conserved as hay for winters. Sharma and Jindal (1989) found that introduction of Fescue in apple orchard gave 83.50 % higher fodder yield over local grasses in Shimla hills of Himachal Pradesh. There is considerable area under orchards in temperate regions. Inter spaces between fruit trees could be utilized for the production of fodder by growing perennial grasses and legumes. In U.P hills (Singh, 1995) reported that Rye grass and orchard grass are the best perennial grasses for introduction in apple orchards. Soil nitrogen build up was the maximum with white clover introduction.

## Conclusions

Importance of forage production in maintaining food security as well as nutritional security has been felt since long. The overall scene of forage production is very alarming and corrective measures have to be taken to improve this problem. A comprehensive grazing policy needs to be formulated and both grazing and forage cultivation has to be considered complementary to each other and simultaneous efforts are required to improve both. Fodder tree improvement programmes for higher leaf fodder have to be initiated. For the improvement of grasslands, its management needs to be considered holistically promoting interaction between grassland, livestock and grazing communities. Therefore, the vast natural resource can serve human society substantially, more particularly grazing communities. A favorable policy environment in terms of access to micro-credit and assured market will have to be provided and simultaneously there is need to address the socio-economic and technical constraints.

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## Forest generations (tribes)

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### Abstract

The accessible testimonial is accurate on the forest generations or tribal details from Telangana state. A total of 20 tribes have been documented as usual they are living with forests. Of individual's tribes, their names, distributed districts, forest regions, local names or sub divisions. The marvellous, their traditional knowledge on medicinal plants and ethno-botany discussed in detailed. In the current grades the importances of the tribes in forest curative plants insight have been pragmatic. The details of table were specified their information. This assortment of information might donate scrupulously in fashionable research in drug devious or in government policies to infringement existing new medicine create systems in tribal origin areas, and in the fortification of advance formulations with encouragement to the tribal healing therapeutic pants.

### Introduction

Telangana state is very rich in the variety of cultures that represent all stages of human progress. We have the Chenchus, as primitive as those who lived in Stone Age and at the same time such as Gonds who are in no way inferior to their neighbours. Andhs and Bhils are backward and yet assimilated enough to be hardly distinguished. From the Gond settled cultivators to the Koyas and Konda Reddis

who are still found inclined to indulge in shifting cultivation, we see the Chenchus who would not care to produce anything and prefer to live on the roots, tubers and other forest produce. There are such of them who in spite of being primitive have lost their dialects and those who are almost getting de-tribalized and yet maintain their own dialects. This is an example of the Chenchus and the Gonds. Starting from the Gonds and Naikpods and their dependent communities of Pardhans, Thotis and Kolams, the dwellers of the highland of Adilabad, we can survey the tribals southwards looking through Karimnagar, Warangal and Khammam districts where Koyas and Konda Reddis are concentrated. We can go further down south and climb up the Nallamala Plateaux of Mannanur and Farahabad of Mahaboobnagar district to see the Chenchus. For Andhs and Bhils, we have to look in the opposite direction, viz., North-West in to the district of Adilabad.

Only the following 9 were declared as Scheduled Tribes in erstwhile Hyderabad state under the Constitution (Scheduled Tribes) Order, 1950 (Published in the Gazette of India, New Delhi, dated September 6, 1950) with the assent of the President of India. 1. Andh 2. Bhil 3. Chenchu or Chenchwar. 4. Gond (including Naikpod and Raj Gond). 5. Hill Reddis or Konda Reddis. 6. Kolam

(including Mannarvarlu). 7. Koya (including Bhine Koya and Rai Koya). 8. Pardhan. 9. Thoti. December 7, 1950) declaring several villages in Mahaboobnagar (Achampet Taluq), Adilabad, Warangal and Khammam as Scheduled Areas within the erstwhile State of Hyderabad. The term "Scheduled Tribes" first appeared in the Constitution of India. Article 366 (25) defines Scheduled Tribes as "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this Constitution". Article 342 prescribes the procedure to be followed in the matter of specification of Scheduled Tribes. Empowered by Clause (1) of Article 342, the President may, with respect to any State or Union Territory, and where it is a State, after consultation with the Governor there of, notify tribes or tribal communities or parts of these as Scheduled Tribes. This confers on the tribe or part of it a Constitutional status invoking the safeguards provided for in the Constitution, to these communities in their respective States/UTs. Clause (2) of the Article empowers the Parliament to pass a law to include in or exclude from the list of Scheduled Tribes, any tribe or tribal community or parts of these. Thus, the first specification of Scheduled Tribes in relation to a particular State/ Union Territory is by a notified order of the President, after consultation with the State Governments concerned. These orders can be modified subsequently only through an Act of Parliament. The above article also provides for listing of Scheduled Tribes State/Union Territory wise and not on an all India basis.

Telangana is a state in the south of India. It is situated on the centre-south stretch of the Indian peninsula on the high Deccan Plateau. It is the twelfth largest state and the twelfth-most populated state in India with a geographical area of 112,077 km<sup>2</sup> (43,273 sq mi) and 35,193,978 residents as per 2011 census. On 2 June 2014, the area was separated from the northwestern part of Andhra Pradesh as the newly formed 29th state with Hyderabad as its historic permanent capital. Its other major cities include Warangal, Nizamabad, Khammam and Karimnagar. Telangana is bordered by the states of Maharashtra to the north, Chhattisgarh to the east, Karnataka to the west and Andhra Pradesh to the east and south. The terrain of Telangana region consists mostly of hills, mountain ranges, and thick dense forests distribution of 27,292 sq. km. As of 2018, the state of Telangana is divided into 31 districts.

Telangana is situated on the Deccan Plateau, in the central stretch of the eastern seaboard of the Indian Peninsula. It covers 112,077 square kilometres (43,273 sq mi). The region is drained by two major rivers, with about 79% of the Godavari River catchment area and about 69% of the Krishna River catchment area, but most of the land is arid. Telangana is also drained by several minor rivers such as the Bhima, the Maner, the Manjira and the Musi.

The annual rainfall is between 900 and 1500 mm in northern Telangana and 700 to 900 mm in southern Telangana, from the southwest monsoons. Various soil types abound, including chalkas, red sandy soils, dubbas, deep red loamy soils, and very deep black cotton soils that facilitate planting mangoes, oranges and flowers.

Telangana is a semi-arid area and has a predominantly hot and dry climate.

Summers start in March, and peak in May with average high temperatures in the 42 °C (108 °F) range. The monsoon arrives in June and lasts until September with about 755 mm (29.7 inches) of precipitation. A dry, mild winter starts in late November and lasts until early February with little humidity and average temperatures in the 22–23 °C (72–73 °F) range.

#### **Tribes from Mahabubnagar district**

Balmor, Kondnagol, Banal, Bilakas, Dharawaram, Apaipalli, Rasul Cheruvu, Puleechelma, Marlapaya, Burj Gundal, Agarla Penta, Pullaipalli, Dukkah Penta, Bikit Penta, Karkar Penta, Boramacheruvu, Yemlaya, Irlapenta, Mudardi Penta, Terkaldari, Vakaramamidi Penta, Medimankal, Pandibore, Sangrigundal, Lingabore, Rampur, Appapur, Malapur, Jalal Penta, Piman Penta, Railet Vetollapalli, Patur Bayal, Bhavi Penta, Naradi Penta, Tapasi Penta, Chandragupta, Ullukatrevu, Timmareddipalli, Sarlapalli, Tatigundal, Elpamaehenu, Koman Penta, Kollam Penta, Mannanur, Macharam, Malhamamdi, Venkateshwarla Bhavi, Amrabad, Tirmalapur, Upnootqla, Madhavanpalli, Jangamreddi Palli, Pedra, Venkeshwaram, Chitlamkunta, Lachampur, Udmela, Mared, Ippalapalli, Maddimadag, Akkaram, Ainol, Siddapur, Bamanpalli, Ganpura and Manewarpalli villages of Achampeth Taluq of Mahubnagar district Achampeth Taluq of Mahubnagar district. Achampeth Taluq of Mahubnagar district

Forests are the spring for province. In India diverse climatic condition would be seen. All 29 Indian states have their own government and the 7 Union territories come under the jurisdiction of the Central Government. As most of the other

countries India too has a national emblem - The lion capital. Apart from India's national emblem, each of its States and Union Territories have their own state seals and symbols which include state animals, birds, trees, flowers etc.<sup>[1]</sup> A list of state trees of India is given below. See Symbols of Indian states and territories for a complete list of all State characters and seals.

Forests are the source for life, tradition and culture. Many of the tribes living together forest, the study relation of plant and man is called ethno botany. In the present report the ethno-botany of Telangana studied with reference to tribes.

#### **Methodology**

A number of scenery trips were undertaken in study area and sources (Fig. 1). At each one time of trip, diverse ethnic and forest or rural people's information was collected in different seasons. The information was accrued after discussions with several users like village head, elder women and other local informants. Repeated interviews through questionnaires were made in diverse villages to substantiate the information. Plant specimens were collected and identified with regional floras (Gamble 1928, Pullaiah and Chennaiah 1997, Pullaiah and Moulali 1997, Pullaiah 2015).

#### **Results**

The accessible testimonial is accurate on the forest generations or tribal details from Telangana state. A total of 20 tribes have been documented as usual they are living with forests. Of individual's tribes, their names, distributed districts, forest regions, local names or sub divisions. The marvellous, their traditional knowledge on medicinal plants and ethno-botany discussed in detailed. In the current grades the importances of the tribes in forest

curative plants insight have been pragmatic. The details of table were specified their information. This assortment of information might donate scrupulously in fashionable research in drug devious or in government policies to

infringement existing new medicine create systems in tribal origin areas, and in the fortification of advance formulations with encouragement to the tribal healing therapeutic pants.

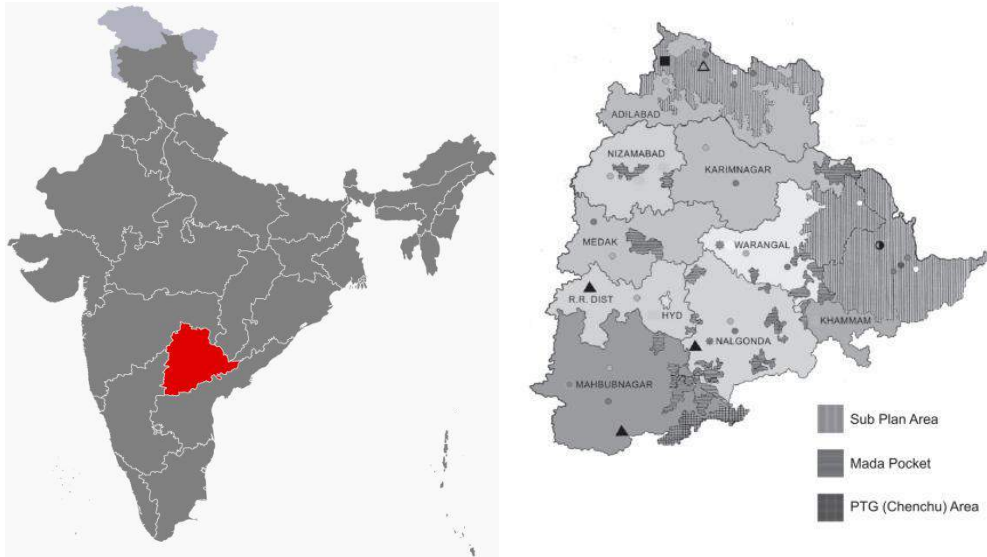


Figure 1, Specific Study area i.e., Telangana State, India.



Figure 2, Chenchus of Telangana State, India.

Table-1: The forest generations (Tribes) of Telangana Sate,

Sl. No	Name of the tribe	Located area	Sub categories
1.	Gond – Kolam Region	Adilabad district	Gondes



2.	Koya – Konda Reddi Region	Adilabad district	Lalkhair (Hindi) Chnadra (Telugu)
3.	Chenchu Region	Adilabad district	Inupa thumma
4.	Plain Areas	Adilabad district	White barkard Tella thumma
5.	Andhs	Madhya Pradesh, Telangana (erstwhile Andhra Pradesh) and Maharashtra	Adavithumma
6.	Bhils		Babul Nalla thumma
7.	Koitur or Koi in their Gondi		Haldu Bandaru
8.	_Naikpods		Bel, Stone apple Maaredu
9.	Kolams	Adilabad district	Maharukh Peddamaanu
10.	Thotis	Adilabad, Hyderabad, Karimnagar, Khammam, Mahaboobnagar, Medak, Nalgonda, Nizamabad and Warangal	Narlingi Konda Chiga
11.	Pardhans	Adilabad district	Siris Dirsenam
12.	Koyas	Mulug (Eturnagaram) Taluka of Warangal district and Bhadrachalam and Nugur Taluks of Khammam district.	Each sub-division of Koyas is further divided in to five exogamous clans; 1. Perumboyadu (Arogatta) gotram, 2. Aidogatta; 3. Yedogatta, 4. Mudogatta, 5. Naligatta,
13.	Konda Reddis	side of river Godavari in	White siris Chigra

		the hilly and forest tracts of Khammam district	
14.	Chenchu	Upper and lower plateau of Amrabad in Mahbubnagar District and the Nallamalai hills are the home of the Chenchus.	Devils tree Eda-kulu
15.	Lambadas/Sugaali/Banjaara	throughout the state of Telangana	Lambada tribe is divided into five phratries viz., 1. Bhukya (Rathod) 2. Vadthiya (Jadhav) 3. Chowhan 4. Pamar 5. Banoth (Ade)
16.	Yanadis	here and there in Telangana.	The sub divisions are: 1. Manchi Yanadis or Reddi Yanadis (Cultivators and servants) 2. Adivi Yanadis (those living in forests) 3. Paki Yanadis (Scavengers) and 4. Challa Yanadis (those who collect left out food from leaf plates in the dust bins).
17.	Yerukala	throughout Telangana	The sub-divisions are Dabba Yerukala (those who make baskets from split bamboo), Yeethapullala (Date twigs) ‘Yerukala (those whom make baskets from wild date leaves), Kunchapuri Yerukala (those who make weaver’s combs), Parikamuggula Yerukala (sooth sayers and beggars), Karivepaku (curry leaves) Yerukala (hawkers of curry leaves), Uppu (salt) Yerukala (salt hawkers).
18.	Nakkala	most of the districts of Telangana,	Nakkalas are also called by other people as “Guvvalavallu” (Dove catchers), “Pittalollu” (Bird catchers) and “Shikaris” in Telangana while they are called “Narikorva”(Fox hunters), “Oosikorva”(Needle sellers) and “Kurvikaran” (Bird catchers) in Tamilnadu and “Hakkipikki” in Karnataka. They have their own dialect

			called “Nakkala bhasha” and it has no script. They sometimes call themselves “Vaghriwala” in their dialect.
19.	Dulia and Dhulia	most of the districts of Telangana,	Names are Vântâlâ (snake), Killo (Tiger), Pângi( Kite), Kinbudi (Bear), Goluri (Langur), Korrâ (Sun), Guntâ (fish) and Burudi (Cow).
20.	Boya Valmikis	most of the districts of Telangana,	No sub names

### Conclusion

The present document conclusion will be possessions on future rights of forest tribes role in biodiversity conservation. Consecutively, works into initiations are needed to undertake widespread education about the tribal population and their importance conservation of ethnic wisdom on medicinal plants. A very few of the wisdom of forest plants is available. So, the efforts must be affianced to safeguard for conservation of tribal knowledge on ethno botany and also the countryside intelligence for vision forest conservation and expansion.

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## Diversity of macro-fungi in Central India-XVIII: *Cookeina tricholoma*, a cup fungus from Maharashtra

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### Abstract

The present article report an ascomycetous cup fungus, *Cookeina tricholoma* occurring on dead stem of *Caryota urens* (bherlimad) and logs of *Xylia xylocarpa* from Maharashtra. Previously it was reported from Jalpaigudi, West Bengal on unidentified dead stem.

### Introduction

Genus *Cookeina* is a member of cup fungi, family Sarcoscyphaceae. Species placed in this family are distributed in tropical and subtropical regions of the world. *Cookeina* species were reported to be growing on different substrates, fallen branches of angiosperms, trunks, and rarely on fruits (Weinstein et al., 2002). Species of this genus have a deep, cup-shaped to funnel-shaped fruiting bodies, known as apothecia which are brightly colored. The excipulum is a thin and flexible tissue making walls of the apothecium. When hairs are present on the apothecium, it is known as fasciculate. There are 27 names proposed under this genus (www.index fungorum, page visited on 09/11/2018) of which 19 names are still in use. Six species were reported from India till date (Table 1).

The present article report *Cookeina tricholoma* occurring on dead stem of *Caryota urens* and logs of *Xylia xylocarpa* from Maharashtra.

### Materials and methods

Specimens were collected Kudal forest areas, Maharashtra. Identification of fungi was done with the help of literature (Denison, 1967; Iturriaga and Pfister, 2008; Kar and Pal, 1970; Kaushal, 1987; Patil et al., 2012; Pfister and Kaushal, 1984; Seaver, 1936; Thind and Batra, 1957; Wang, 1997) and matter available on net. The slides were prepared in lactophenol and cotton blue and observed under advance Research Microscope, make Leica, Germany and photomicrographs were taken with a digital camera attached to the microscope. The specimens were deposited in the Mycology Herbarium, Tropical Forest Research Institute, Jabalpur and got accession numbers.

### Results

#### *Cookeina tricholoma* (Mont.) Kuntze (Figures 1-10)

(Sarcoscyphaceae, Pezizales, Pezizomycetidae, Pezizomycetes, Pezizomycotina, Ascomycota)

Synonymy:

=*Peziza tricholoma* Mont.

=*Lachnea tricholoma* (Mont.) Pat.

=*Trichoscypha tricholoma* (Mont.) Cooke

=*Pilocratera tricholoma* (Mont.) Henn.

=*Pilocratera tricholoma* (Mont.) Henn.

var. *tricholoma*

=*Peziza tricholoma* var. *minor* Mont.

=*Peziza tricholoma* Mont. var. *tricholoma*

=*Pilocratera tricholoma* var. *celebica*

Henn.

### Taxonomic Description

Typical habitat is on wood like twigs and rotten tree limbs, at low altitudes (usually below 1000 m), in the tropics. Apothecia, goblet to funnel-shaped with an enrolled margin, 1–2 cm in diameter, light orange, pink to pale orange, with 1–3 cm tall cylindrical stipes, conspicuously hairy; hairs stiff, bristle-like, fasciculate, and usually 2–3 mm long. Asci with sub operculate apical apex, cylindrical, long, 8-spored, measuring 275–300 x 10–15 µm. Ascospores pointed-ellipsoid, smooth-walled, biguttulate, 21–32 × 10–13.5 µm. Paraphyses slender, septate, branched and anatomizing (Figs. 1–10).

### Specimens examined

On dead stem of bherlimad or salfi palm (*Caryota urens*) and logs of *Xylia xylocarpa*, Raigaon, Nerul Haveli forest, Kudal range (N15°59'15.13'' E73°38'41.55''), Maharashtra, 12/07/2018. Specimen deposited in Mycology Herbarium, Tropical Forest Research Institute under accession number TF – 4058.

### Discussion

*Cookeina* species have world-wide distribution including: Central America, Mexico, Caribbean, South America, Africa, Asia (India: Andhra Pradesh, Maharashtra, Uttarakhand, Uttar Pradesh and West Bengal), Australia, and the South Pacific (Denison, 1967; Wang, 1997). *Cookeina* species were reported on different substrates including fallen branches of angiosperms, trunks, and sometimes on fruits (Weinstein et al., 2002) (Table 1). The Temuans of Peninsular Malaysia are reported to use certain species of this genus as food, and also as bait for fishing (Chang and Lee, 2004). In the species of this genus, the asci are constricted abruptly below and form a blunt with a rounded base and slim, tail-like connection which mature simultaneously rather than in series (Boedijn, 1933). The occurrence of this genus appeared to be restricted to wood in its early stage of decay.

The present article reports *Cookeina tricholoma* occurring on dead stem of *Caryota urens* and logs of *Xylia xylocarpa* from Kudal, Maharashtra.

**Table 1:** *Cookeina* species reported from India

SN	Name of fungus	Habit	Distribution	Reference
1.	<i>Cookeina colensoi</i> (Berk.) Seaver ≡ <i>Peziza colensoi</i> Berk. = <i>Sarcoscypha colensoi</i> (Berk.) Sacc. = <i>Boedijnopeziza colensoi</i> (Berk.) Korf & Erb,	on rotten wood of <i>Dalbergia</i> sp.	Dehradun, Uttarakhand	Thind and Batra, (1957)
2.	<i>Cookeina indica</i> Pfister & R. Kaushal	on dead branches,	Andhra Pradesh	Pfister and Kaushal (1984)
3.	<i>Cookeina mundkurii</i> S.C. Kaushal (as ' <i>Cookenia</i> ')	on rotten angiospermic twig,	Uttar Pradesh	Kaushal (1987)

4.	<i>Cookeina sinensis</i> Z. Wang,	on dead twigs	Kolhapur, Amba (Shahuwadi) and Gawse (Ajara), Maharashtra	Patil et al. (2012)
5.	<i>Cookeina sulcipes</i> (Berk.) Kuntzeb $\equiv$ <i>Peziza sulcipes</i> Berk.	on unidentified dead stem,	Jalpaigudi, West Bengal	Kar and Pal (1970)
6.	<i>Cookeina tricholoma</i> (Mont.) Kuntze $\equiv$ <i>Peziza tricholoma</i> Mont.	on unidentified dead stem	Jalpaigudi, West Bengal	Kar and Pal (1970) This article

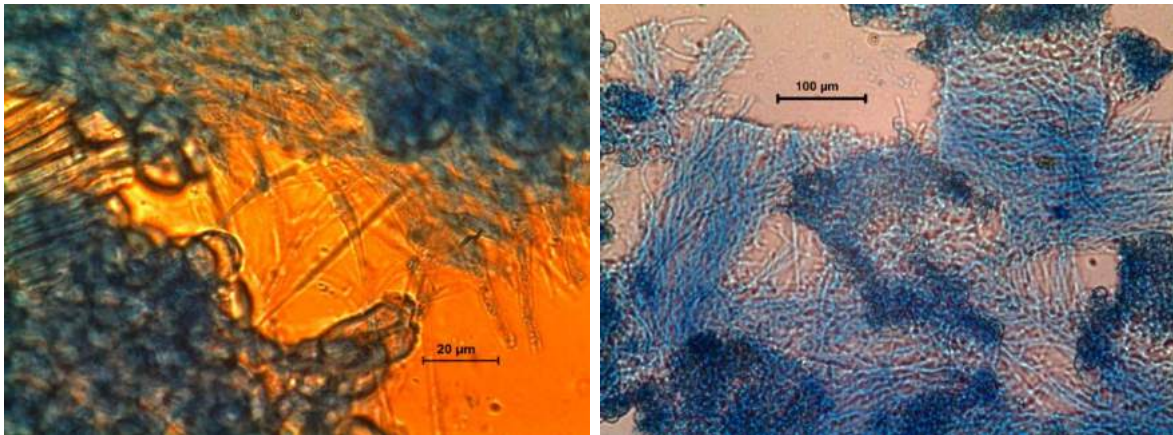


**Figs. 1-2:** *Cookeina tricholoma*: fruit bodies in habit attached to wood logs





**Figs. 3-4: *Cookeina tricholoma*: fruit bodies in habit**



**Figs. 5-6: *Cookeina tricholoma*: anatomical structure**



**Figs. 7-8: *Cookeina tricholoma*: anatomical structure of cylindric short hairs, immature asci and paraphyses in hymenial layer**





**Figs. 9-10: *Cookeina tricholoma*: Asci with developing ascospores**

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## अमरबेल: एक खरपतवार या महत्वपूर्ण परजीवी पौधा

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अमर बेल (Amarbel) एक पराश्रयी लता है, जो प्रकृति का चमत्कार ही कहा जा सकता है। बिना जड़ की यह बेल जिस वृक्ष पर फैलती है, अपना आहार उसी से रस चूसने वाले सूत्र (Suckers) के माध्यम से प्राप्त कर लेती है। इस बेल का रंग पीला और पत्ते बहुत ही बारीक, नहीं के बराबर होते हैं। बेल पर शरद् ऋतु में कर्णफूल की तरह गुच्छों में सफेद फूल लगते हैं। बीज राई के समान हलके पीले रंग के होते हैं। यह बेल वसन्त और ग्रीष्म ऋतु में बहुत बढ़ती है और शीतकाल में सूख जाती है। जिस पेड़ का यह सहारा लेती है, उसे सुखाने में कोई कसर बाकी नहीं रखती। अमर बेल के विभिन्न भाषाओं में नाम इस प्रकार हैं

संस्कृत – आकाशवल्ली

हिंदी – अमर बेल, आकाश बेल

मराठी और गुजराती – अमरबेल

बंगाली – आलोक लता

अंग्रेजी- डोडर (Dodder)

लैटिन – कस्कटा (*Cuscuta Reflexa*)

यह एक प्रकार के परजीवी के रूप में दूसरे पौधों पर आश्रित पौधा होता है। इसके कई नाम हैं जैसे अमरबेल, आकाश बेल, निर्मली आदि हैं। इसके रंग और पत्ते रहित होने के कारण इसे आसानी से पहचाना जा सकता है। इसमें बहुत से औषधीय गुण होते हैं। अमर बेल का उपयोग कब्ज, यकृत, दस्त, सूजन आदि के उपचार में किया जाता है। इसलिए अमर बेल स्वास्थ्य के लिए बहुत फायदेमंद मानी जाती है। यह जिस भी पेड़ या पौधों पर होती है उससे ही अपना पोषण करती है। यह स्वयं अपना भोजन नहीं बनाती है।

अमर बेल अकसर पेड़ों की टहनियों पर फैली हुई पाई जाती है। अमर बेल बहुत कोमल, रसीली, हरी होती है। अमर बेल लगभग पूरे भारत वर्ष में पाई जाती है। अलग अलग राज्यों में अमर बेल को आकाशबल्ली, कसूसे हिन्द, स्वर्ण लता, निर्मुली, आलोक लता, अमर बेल, रस बेल, आकाश बेल, डोडर, नुलु तेगा, अंधा बेल आदि नामों से पुकारा जाता है। अमर बेल पेड़ की जड़ पेड़ की टहनियों के अन्दर से निकलती है और पेड़ की टहनियों का रस चूस कर जीवित रहती है। अमर बेल मिट्टी में नहीं होती इसीलिए इसे आकाश बेल भी कहते हैं। अमर बेल गहरी पीली हरी रंग में पाई जाती है। औषधि के रूप में अमर बेल का आर्युवेद में विशेष स्थान है। अमर बेल को तरह-तरह से औषधि रूप में इस्तेमाल किया जाता है।

अमरबेल किसी पौधे या वृक्ष से एक बार जुड़ जाने के बाद हमेशा के लिए स्थाई घर बना लेती

है। जिस पौधे या वृक्ष में अमरबेल अपना आशियाना बनाती है, वह जब तक नष्ट नहीं होता है तब तक यह पूर्ण परजीवी पौधा जीवित रहता



है। अमरबेल एक पत्ता व जड़विहिन पौधा है जो बहुत ही खतरनाक है और यह बड़े- बड़े पेड़ पौधों को भी उनमें से जल और पोषक पदार्थों को चूसकर मृतप्राण बना देता है। इसे अक्सर पेड़ों पर झूलती हुई अवस्था में पीला या नारंगी रंग में देखा जाता है। अमरबेल को स्वर्णलता, अमरलती, आकाश बल्ली, चुड़ैल बाल, निर्मली आदि कई नामों से भी जाना जाता है। इसका वैज्ञानिक वनस्पति नाम कस्कुटी है जो मध्य ग्रीष्मकाल से लेकर बसंत ऋतु के आने तक काफी तेजी से बढ़ता है एवं दुनिया के सात सर्वाधिक खतरनाक खरपतवार में से एक है। अमरबेल के प्रकोप से सदैव कीटों से ढके रहने वाला कैक्टस भी बच नहीं पाते हैं। यह कपास तथा पटुआ की फसलों पर भी अपना डेरा जमा लेती है।

यह एक ही वृक्ष पर प्रतिवर्ष पुनः नवीन होती है तथा यह वृक्षों के ऊपर फैलती है, भूमि से इसका कोई सम्बन्ध नहीं रहता अतः आकाशबेल आदि नामों से भी पुकारी जाती है। अमरबेल एक परोपजीवी और पराश्रयी लता है, जो रज्जु (रस्सी) की भांति बेर, साल, करौंदे आदि वृक्षों पर फैली रहती है। इसमें से महीन सूत्र निकलकर वृक्ष की डालियों का रस चूसते रहते हैं, जिससे

यह तो फलती - फूलती जाती है, परन्तु इसका आश्रयदाता धीरे - धीरे सूखकर समाप्त हो जाता है।

ऐसा माना जाता है कि:

- अमरबेल को तिल के तेल में या शीशम के तेल में पीसकर सर पर लगाने से गंजेपन में लाभ होता है तथा बालों की जड़ मजबूत होती है।
- लगभग ५० ग्राम अमरबेल को कूटकर १ लीटर पानी में पकाकर, बालों को धोने से बाल सुनहरे व चमकदार बनते हैं तथा बालों का झड़ना व रुसी की समस्या इत्यादि भी दूर होती है।
- अमरबेल के १०-२० मिलीलीटर रस को जल के साथ प्रतिदिन प्रातःकाल पीने से मस्तिष्कगत तंत्रिका (Nervous System) रोगों का निवारण होता है।
- अमरबेल के १० मिली स्वरस में ५ ग्राम पिसी हुई काली मिर्च मिलाकर खूब घोटकर नित्य प्रातः काल सेवन से बवासीर में विशेष लाभ होता है।
- अमरबेल को पीसकर थोड़ा गर्म कर लेप करने से गठिया की पीड़ा में लाभ होता है तथा सूजन शीघ्र ही दूर हो जाती है। अमरबेल का काढ़ा बनाकर स्नान करने से भी वेदना में लाभ होता है।
- अमरबेल के २-४ ग्राम चूर्ण को या ताज़ी बेल को पीस कर थोड़ी सी सोंठ और थोड़ा सा घी मिलाकर लेप करने से पुराना घाव भी भर जाता है।

अमर बेल के फलों का सेवन करने से हड्डियों (Bones) को मजबूती मिलती है, क्योंकि इसमें उपस्थित कैल्शियम हड्डियों की कोशिकाओं को पोषण देने का काम करता है। यह ऑस्टियोपोरोसिस (osteoporosis) के लक्षणों

से बचाने और हड्डियों को फ्रैक्चर से बचाने में मदद करता है। खास तौर पर ये बुजुर्गों के लिए जो सामान्य रूप से ऐसी समस्याओं का सामना कर रहे हैं। शरीर में रक्त प्रणाली के व्यवस्थित रूप से काम करने और उन्हें मजबूत बनाने के लिए अमर बेल के बीज लाभदायक होते हैं। इन बीजों में उपस्थित पोषक तत्व मस्तिष्क और तंत्रिका तंत्र (nervous system) में आक्सीजन की आपूर्ति करने में मदद करते हैं। इसलिए अमरबेल के फलों का सेवन कर शरीर में रक्त परिसंचरण को सही बनाया जा सकता है। अमर बेल के बीजों में उपस्थित फाइबर वसा के अवशोषण और पाचन प्रक्रिया को नियंत्रित करने में मदद करता है। इसलिए यह वजन घटाने वाले उत्पादों में अपनी जगह बना चुका है। इसमें कोई संदेह नहीं कि अमर बेल के बीज वजन को नियंत्रित करने और स्वस्थ वजन को बनाए रखने में फायदेमंद है। अमर बेल के फलों में फाइबर (fiber) उपयुक्त मात्रा में होते हैं जो कि पाचन तंत्र के लिए फायदेमंद होता है। यह आंतों की जकड़न को दूर कर उनको मजबूत बनाने का काम करते हैं। यह फैट को अवशोषित कर पाचन क्रिया को मजबूत करता है। अमर बेल के बीज ब्लड प्रेशर को भी नियंत्रित कर सकते हैं। यह उच्च रक्तचाप को कम करने में फायदेमंद हो सकता है। यदि किसी को उच्च रक्तचाप की समस्या है तो यह उसके लिए एक औषधी का काम कर सकता है। अमर बेल में हृदय को स्वस्थ रखने की क्षमता होती है। इसके सेवन से स्ट्रोक या दिल का दौरा जैसे हृदय संबंधी रोगों से बचाने में मदद मिलती है। अमरबेल (mistletoe) के बीज कोलेस्ट्रॉल के स्तर को बनाए रखने और रक्त प्रवाह को भी ठीक तरह से काम करने में मदद करते हैं। कुछ लोग गुर्दे (kidney) की समस्याओं के लिए दवा के रूप में अमरबेल के बीजों का उपयोग करते हैं। इसलिए यह आमतौर पर पेशाब से संबंधित रोगों में भी काम करता है। अमर बेल के बीज दर्द को

कम करने और गुर्दे (kidney) को स्वस्थ बनाए रखने में मदद कर सकता है। साथ ही यह महत्वपूर्ण पोषक तत्वों को अवशोषित करने और विषैले पदार्थों को बाहर निकालने में गुर्दे की शक्ति को बढ़ाता है। अमर बेल में प्रतिरोधक क्षमता होती है जो कि इसका एक विशेष गुण है जिसके कारण हमारे स्वास्थ्य के लिए बेहद फायदेमंद होती है। इसका सेवन करने से हमारे शरीर की प्रतिरोध शक्ति (resistance power) में वृद्धि होती है और यह हमें विभिन्न रोगों से लड़ने में समर्थ बनाता है। यह हमारे शरीर को मजबूत और स्वस्थ बनाए रखने में मदद करता है। अमरबेल के इन अनोखे गुणों के कारण यह हमारे स्वास्थ्य के लिए फायदेमंद होता है। इसलिए अपनी प्रतिरक्षा शक्ति को बढ़ाने के लिए अमर बेल का उपयोग कर सकते हैं। अमर बेल के बीजों का उपयोग आंखों के उपचार के लिए भी किया जाता है। यह स्वस्थ आंखों के प्रबंधन में महत्वपूर्ण भूमिका निभाती है और आंखों की बीमारियों को रोकती है। इसमें उपस्थित विटामिन A आंखों के लिए जरूरी होता है। इसका सेवन करने से मोतियाबिंद (cataracts) और उसके होने की संभावना से बचा जा सकता है। यह मुख्य रूप से वृद्ध लोगों के लिए लाभकारी होती है जिन्हें मोतियाबिंद जैसी समस्याओं का सामना करना पड़ता है। इसलिए आंखों से संबंधित रोगों को रोकने के लिए अमरबेल लाभकारी विकल्प है और इसका सेवन नियमित रूप से करना चाहिए। सूजन को कम करने की एक और विशेष क्षमता अमर बेल के बीजों में होती है। इसलिए यह सूजन को कम करने का एक लाभकारी व प्रभावी विकल्प हो सकता है। यह दर्द तथा सूजन को ठीक करने में सक्षम होता है। आकाश बेल के बीजों का उपयोग कैंसर के उपचार के लिए एक अच्छा विकल्प होता है। इसका सेवन करने से नई लाभप्रद कोशिकाओं के निर्माण को गति दे सकता है और



नुकसान दायक कोशिकाओं के निर्माण को कम करने में सहायक होती है। इस कारण कैंसर विरोधी औषधी के रूप में काम करती है और कैंसर के जीवाणुओं की वृद्धि को नियंत्रित या कम करती है। अमरबेल (Dodder seeds) एक आयुर्वेदिक औषधी है, पर कभी कभी इसके उपयोग से कुछ समस्याएं हो सकती है इसलिए इनका उपयोग पूरी जानकारी होने पर ही करना चाहिए नहीं तो यह हमारे लिए बड़ा नुकसान बन सकता है।

आकाश बेल से होने वाले नुकसानों की सूची बहुत छोटी है लेकिन फिर भी इसका सेवन धीरे-धीरे और थोड़ी मात्रा में करके देखना चाहिए जिससे स्वास्थ्य पर इसका प्रतिकूल प्रभाव न पड़े और अमर बेल का सेवन करते समय किसी औषधीय विशेषज्ञ की सलाह अवश्य लेना चाहिए जिससे इसके सेवन से होनेवाले संभावित नुकसान से बच सकें।

## Know Your Biodiversity

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### *Aconitum heterophyllum*



*Aconitum heterophyllum* is an herb which is known for its important medical properties. It belongs to order Ranunculales and family Ranunculaceae. It is commonly known as Atish, Patish and Ativisha and used as the main ingredient in many formulations in Ayurveda. It is commonly found in alpine to sub-alpine open slopes at altitude of 2000-5000 meters. It prefers open, sunny sites with abundant soil moisture during summer months.

This species is endemic to Himalayan region of India, Pakistan, Iran and Nepal. It is native to the western Himalayas and found in Jammu & Kashmir, Himachal Pradesh and Uttarakhand and Sikkim. In Himachal Pradesh it is found in Kangra, Chamba, Sirmour, Shimla, Kullu, Lahaul-Spit and Kinnaur districts at altitude 2500-4500 m. It is also found in Saithal, Scoj and Kihoi in Anantanag areas of Jammu

& Kashmir and Dayara, Rudranath, Kuovaripass, Kyarki and Bedani areas of Uttarakhand. *Aconitum heterophyllum* is herbaceous, perennial plant. The tubers are up to 3 cm long and conical at the ends. The mother and daughter tubers occur in pairs. Tubers contain the alkaloids aconite, mesaconite, hypaconitine, atisine, heteratisine, telatisine and atidine. The stem is clasping, erect and upto 1m tall. The branches are absent or rarely one or two in number. Leaves are broad, ovate, cordate, lobed and toothed, shortly stacked or sessile amplexicaule. Lower leaves are long petioled while upper cauline leaves are sessile, amplexicaule. Flowers bright blue usually in lax spike like cluster with very variable bracts greenish purple conspicuously dark veined. Corolla is hairy. Carpels are five in number and containing 10–18 follicles. Seeds are pyramidal, 3-4 mm long and dark brown. Flowering and fruiting period is July-October.

It is also cultivated in India and propagation is done either by divisions of roots or from seeds. Sandy loam and slightly acidic soil, retentive of moisture, in sun or partial shade, with pH about 6 has been found to be the best for seed germination, survival, better growth, and yield and seed germinate only in the beginning of the spring, March to April. Addition of humus or leaf litter to the soil increases survival rate and growth of seedlings at all altitudes. Seeds are collected during late October to mid-

November in morning hours for better germination and seeds are sown during March-April after the snow melts.. The seedlings are transplanted at a distance of about 30cm in well prepared fields after two months. Roots are collected during September-November from the wild and the same season in the third year from the cultivation. Roots are dried, freed from the dust, root fibres and graded before being packed and stored.

Due to the presence of alkaloids, carbohydrates, proteins and amino acids, saponins, glycosides, quinones, flavonoids, terpenoids etc. it is used in some formulations in the traditional healing system of India, i.e., Ayurveda. It is reported to have use as an anthelmintic, anti-inflammatory, antipyretic, analgesic, astringent and febrifuge. It is useful in treating coughs, diarrhoea indigestion and reproductive disorders. It is a valuable drug for infants in dentition, diarrhoea, fever and vomiting. Traditionally it has been used as an antidote against poisoning due to scorpion or snake bite. The aqueous extract of the root induces hypertension through action on the sympathetic nervous system and its higher dose become lethal. The roots are used as an astringent in bleeding piles, amenorrhoea and leucorrhoea and are an ingredient of Yunani medicines.

Due to immense medicinal importance and high price in the market have lead to an indiscriminate harvesting from the wild region and the species is now categorised as critically endangered (IUCN, 1993 and CAMP, 2003). *Aconitum heterophyllum* is a highly traded medicinal plant among all *Aconitum* species and is prohibited for export in India if the plants have been collected from the wild. Cultivated specimens can be exported from India and

it has vast potential in improving the socio-economic conditions of the locals in high hill temperate areas as this species is suitable for intercropping with Apple and Cherry. Hence along with the sustainable harvesting and conservation of natural habitats, intensive studies on the population trend, reproductive biology and propagation techniques need to be carried out along with conservation programs.

#### *Moschus leucogaster*



*Moschus leucogaster* is commonly known as Himalayan musk deer. It differs from other deer in not having antlers and facial glands. It belongs to order Cetartiodactyla and family Moschidae. They reside in the Himalayan mountain range, particularly within the countries of Bhutan, India, Afghanistan Nepal, and a small part of China. In India, they found in Jammu and Kashmir, Sikkim, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Uttar Pradesh and Assam. It inhabits sub-alpine and alpine vegetation at an altitude of 2500 to 4800m.

Musk deer are mostly seen feeding in open alpine grasslands. It feed on a variety of food viz. leaves of woody plants, forbs, lichen, moss, ferns and grasses. During the winter time they also feed on lichens and mosses. Himalayan musk deer are preyed on by leopard, lynx, yellow-throated marten, red fox, grey wolf, and wild dogs.

It is a shy, brownish yellow, dog sized, mountain ruminant and can be easily differentiated from the alpine musk deer in

having dark legs and chest with no chest stripe. Himalayan musk deer weight is around 11 to 18 kg and 86 to 100 cm in length. The coat of is brownish yellow with weak striations. The head is grey-brown, and the ears are brown while the rim and inside are greyish white. The eye-ring is a poorly expressed grey. The throat, legs and rump are dark. The bases of dorsal hairs are pure white. Although both sexes have long upper canines, the males' grow longer, up to 7 to 10 cm. The canines break easily, but tooth growth is continuous. In addition, male Himalayan musk deer have a musk sac and a caudal gland at the base of their tail, both of which play a role in communication.

The musk gland attracts females during mating season, and the caudal gland is also used to mark territory. They are fairly sedentary occupying a small home range of up to 22 hectares. Male are fiercely territorial, only allowing females to enter their range. Himalayan musk deer mate between November and January and the gestation period is 185 to 195 days. Average life span of Himalayan musk deer is 10 to 14 years.

Himalayan musk deer is listed as endangered in IUCN Red List. Population existence of Musk deer is threatened across its habitat due to deforestation, habitat fragmentation and anthropogenic activities viz. poaching. Musk deer is hunted for its meat, fur and musk glands. The musk produced by Musk deer is considered highly valued for its cosmetic and alleged pharmaceutical properties. Around 25 g of musk can be extracted from a single musk sac and can fetch U.S. \$45,000 per kilogram (2.2 pounds) on the international market. China is the largest exporter (>200 kg/annum) of musk and Japan is the largest importer. Estimates on

the probable number of musk deer killed in the Himalaya during the 1970s and 1980s vary between 5350 and 16,000 every year (Green 1985, 1989).

Beside anthropogenic activities, habitat degradation due to increasing human pressure on the musk deer's habitat is another major reason for the decline in their numbers. About 70 per cent of potential musk deer habitat on the southern side of the Greater Himalaya has already been lost (Green 1985, 1986). Despite several nations making musk deer trade illegal, poaching and subsequent smuggling still continues due to high market demand. Hence conservation of musk deer and its natural habitat coupled with anti-poaching awareness is urgently required for the conservation of this species.

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