

Occurrence and diversity in host by Mistletoes from fire families in East Melghat Forest

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Abstract

The present paper deals with an intensive and extensive exploration of diversification in host by the Mistletoes from fire families like Loranthaceae, Viscaceae from East Melghat Forest. During exploration from 2005-2010, It was noted that Mistletoes as aerial partial parasite found on the number of host plants. On the basis of their occurrence the hosts are categories as principle host, secondary host and Minor host. In all during frequent visits to these forest areas on above said period by the authors, a record of 10 host plants used by the Mistletoes is noticed. This is the first report about the occurrence of Mistletoes on large number of host plants. Paper also includes some of the harmful effects caused by the Mistletoes on the forest vegetation.

Keywords: Diversity, Hosts, Mistletoes and East Melghat Forest

INTRODUCTION

Melghat which is known as the paradise of Vidarbha is a source of perennial pleasure. In the year 1974, nine tiger projects were brought into being and one of them is our 'Melghat'. But this year Melghat Forest ranks in third number amongst all the tiger reserves. In order to establish close proximity with the life in Melghat we have to spare some time to read the silver setting which is blessed with no. of things, for instance, ancient movements revealing Indian culture, precious medicinal plants, rare species of nature.

Melghat means 'meeting of the Ghats' which is just what the area is, a large tract of unending hills and ravines scarred by jagged cliffs and steep climbs. The exquisite hill forests, thick undergrowth and moss-covered trees underscore its virgin confines. It lies at the northern extreme of the Amravati District on the border of Madhya Pradesh, in the southwestern Satpuda mountain ranges. East Melghat Forest Division is situated in the North East of Amravati district of Maharashtra State and administratively it is under Amravati Forest Circle. Geographical Co-ordinates are Latitude 21° 13' 14" to 21° 46' 6" North & Longitude 77° 10' 39" to 77° 36' East. Total area covers an area of East Melghat Forest 30936.81 ha.

The forests of East Melghat Project are of deciduous nature and have been classified as "Dry deciduous forest", fall under the sub-group 5-A southern tropical dry deciduous type. The general distribution of rainfall, change in depth and nature of soil and geological formation are responsible in determining the local variations within the above broad type. The most of the area has the soil of trap origin. These soils are rich in mineral and humus and

have a high water holding capacity. They have a high rate of exchangeable calcium and pH varying from 6.5 to 7.5 thus supporting the best form of teak. Alluvial deposits along Tapti in Rangubeli and in Dhakna supports good development of teak forests along with bamboos. Teak needs a good quantum of moisture to support its long growing season. But in some areas the teak is soon replaced by Salai (*Boswellia serrata*) and Tiwas (*Ougeia oogeinensis*). East Melghat Forest has a considerable large expanse. Its richness in biological diversity and the potential of holding large number of flora and fauna is very unique in the Maharashtra state. The forest at East Melghat Forest is rich in teak and other varieties of timber. Thus it is a special attraction to the men of commerce and the botanist. The floristic composition changes along with the altitudes.

A complete survey in east Melghat region for the exploration of these parasites on the tree plants in last two years. All above reported parasites with their different hosts are collected along with flowers and fruiting conditions. The collected material is dried and herbarium specimens are prepared and deposited in Department of Environment, Shipna college of Chikhaldara. Photographs are also taken wherever possible. This is the first new report about the diversification of host by the mistletoes from Vidarbha region.

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OBSERVATION AND RESULTS

List of host species of Mistletoes in East Melghat Forest

Host species of *Macrosolen parasiticus* (L.) Danser.

S. N.	Host species	Parasite	Height from MSL (Alt.) Ft.	Longitude & Latitude	Location	Category of host	Remark
1	<i>Bombax ceiba</i>	<i>Macrosolen parasiticus</i>	3545	N 21° 24' 2.6" E 077° 19' 19.7"	Near Post office, Chikhaldara	Secondary host	Very rare
2	<i>Butea monosperma</i>	<i>Macrosolen parasiticus</i>	2798	N 21° 25' 18.4" E 077° 23' 8.8"	Bori and Kamapur forest	Secondary host	Very rare on this host in the total Chikhaldara range and Chikhaldara circle

Host species of *Viscum articulatum* Burm.f.

S. N.	Host species	Parasite	Height from MSL (Alt.) Ft.	Longitude & Latitude	Location	Category of host	Remark
1	<i>Boswellia serrata</i>	<i>Viscum articulatum</i>	1725	N 21° 13' 43.0" E 077° 02' 46.9"	Narnala fort	Secondary host	Rare
2	<i>Cordia macleodii</i>	<i>Viscum articulatum</i>	2606	N 21° 22' 59.0" E 077° 24' 17.7"	Hariamrai (Madki)	Secondary host	Rare
3	<i>Diospyros melanoxylon</i>	<i>Viscum articulatum</i>	2778	N 21° 23' 9.7" E 077° 24' 6.4"	Upper plateau of Madki	Principle host	Rare
4	<i>Madhuca indica</i>	<i>Viscum articulatum</i>	2857	N 21° 25' 16.6" E 077° 24' 48.6"	Near Bela bus stop	Secondary host	Very Rare
5	<i>Mangifera indica</i>	<i>Viscum articulatum</i>	2316	N 21° 14' 22.4" E 076° 59' 59.0"	Dhargad	Secondary host	Rare
6	<i>Schleichera oleosa</i>	<i>Viscum articulatum</i>	2751	N 21° 23' 2.9" E 077° 24' 9.4"	Narnala Fort	Secondary host	Rare
7	<i>Terminalia tomentosa</i>	<i>Viscum articulatum</i>	3005	N 21° 14' 26.7" E 077° 01' 56.5"	Narnala fort	Secondary host	Rare
8	<i>Ziziphus oenoplia</i>	<i>Viscum articulatum</i>	2506	N 21° 22' 9.01" E 077° 25' 2.75"	Near Osho point (Manbhang)	Minor host	Rare

DISCUSSION

A new report of *Macrosolen parasitica* on *Bombax ceiba* at the altitude of 3545' which is very rare in east Melghat forest. In case of *Dendrophthae falcata*, hyperparasitism is reported where *Viscum nepalense* occurring as a parasite on the branches of *Dendrophthae falcata*. *Dendrophthae falcata* is a parasite on *Terminalia tomentosa*.

East Melghat Forest has a considerable potential towards the richness in biological diversity in a tropical dry deciduous forest. A survey for the exploration of family Loranthaceae members found on different types of host from 2005-2010. During survey it was noted that there is a vast diversity in occurrence of mistletoes as a semi partial parasite on different host plants. Probably this is due to continuous dispersing of seeds by the number of birds. It was also observed that when in and around the areas no availability of principles host then the plants occurs as parasite on secondary host and the minor host plants. The occurrence of Mistletoes as a parasite is common in certain bits of forest they are consider as a principle host and at some where their occurrence is on the substitute host with rare are consider as secondary host, while the bushy, shrubby or stunted host plants considered as the minor host. In all, way of infection is same that they are occurring on the stem branches, where the seeds get attached or falls. In few cases there is occurrence of *Dendrophthae falcata* and *Scurrula parasitica* on single host plants *Eugenia jambolana*, *Dendrophthae falcata* and *Viscum articulatum* both on *Madhuca latifolia* and *Ziziphus oenoplia*. An interesting observation was there is occurrence of *Scurrula parasitica* (semi-parasitic plants) on the branches of other parasitic plants like *Dendrophthae falcata* this phenomenon is known as hyperparasitism (Saxena, 1971). Same case was also noted in *Viscum articulatum* occurring as a parasite on *Dendrophthae falcata*.

Probably this is due to richness of fauna in East Melghat Forest, the visiting avian are mainly feeds on the fruits of *Eugenia jambolana*, *Mangifera indica*, and meanwhile they may feed on the fruits of mistletoes as the seeds are viscid. A sticky viscin "known as bird glue" coats the mistletoes seeds allowing them to adhere to branches after being deposited there, by defecation or bill wiping (Reid *et al.* 1995) once positioned on an appropriate host, the seed germinates and form a specialized structure, a haustorium, which taps in to the hosts vascular system to absorb water, minerals and nutrients (Calder, 1983).

Mistletoes are the taxonomically diverse group of parasitic plants found in fire families Loranthaceae, Viscaceae, Misodendraceae, Eremolepidaceae and Santalaceae (Restrepo *et al.*, 2002). Most of them are stem partial parasite capable of photosynthesis but dependent on their host for water (Calder, 1983). One of the most interesting aspects of mistletoes system is the relationship between the parasites and their hosts and disperser. Mistletoes are simultaneously mutualists of their animal dispersers and parasites of their host plants. Dispersal is most important in the life history of most organisms and often depends on another organism to facilitate it (Harwood, 1981 and Wenny 2001).

It was observed that mistletoes have many similarities to other parasitic plant; they are often detrimental to their hosts, reducing growth and killing branches and in case of heavy infestation even killing ghosts. The negative effects are largely the result of mistletoes diverting important resources from their host. Mistletoes diverting important resources from their host. Most mistletoe only taps in to the xylem of their host (Marshall J. D. and Ehleringer, 1990). Mistletoes obtain water from their host and often accumulate host derived nitrogen and other minerals in grater proportions than are

found in host branches (Lamont, 1983 and Pate *et. al.* 1991). Phloem tapping mistletoes obtain a large proportion of their carbon from host plants but even some xylem tapping parasite can obtain as much as 60% their carbon from host photosynthetic (Hull and Leonard 1965). Mistletoes typically have high rate of transpiration and can alter the water balance of infected hosts (Ehleringer *et. al.*, 1986 and Marshall *et. al.*, 1994). Parasite can manipulate the actual or perceived quality of host they may be able to attract vectors to that host and thereby increase their transmission. Parasite can influence the attractiveness for infected hosts by modifying a host colour, odor, body temperature or behaviour (Kingolver 1987 and Eigenbrode *et.al*, 2002).

Mistletoes are aerial partial stem parasite found on trees. They have unique ecological arrangements with the host plants, they parasitize and the dispersal of seed take place by birds, but the mistletoes often detrimental to their hosts and can even kill them. Co-evolution has led to resistance mechanism in host and specialization by mistletoes. Birds acts as disease vector for the mistletoes, host in a mutuality relationship, to disperse their seeds. Mistletoes attract and manipulate the bird vector in ways that are typical of both plants and parasites. Mistletoes are important elements on the landscape that influence the spatial distribution and complex interaction make their biology to understand and their management. Due to selection and occurrence of mistletoes on variety of host, number of medicinal and economically important plants and their branches are weakened. Spreading of mistletoes in the East Melghat Forest increasing year after year that will dangerous for richness of forest flora. It was also observed that the yield of *Madhuca latifolia*, *Mangifera indica*, *Terminalia chebula*, *Buchanania lanzan* and *Embllica officinalis* is remarkably decreasing that indirectly affected on the economy of tribals and birds feeding these are totally dependent on this forest products, hence a strong argument to conserve the East Melghat Forest Flora.

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