

Study of the effect of invasive species on the development of grass meadows of Melghat Tiger Reserve, Amravati Maharashtra

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Abstract

Melghat Tiger Reserve is one of the 7th tiger reserve of India. The Melghat Tiger Reserve has the grasses meadows in Gugamal National Park and Akot wildlife division specially in the relocated villages of MTR. The grasses meadows comprises the palatable grasses species like *Themeda triandra* , *Themeda quadrivalvis* , *Heteropogon contortus* , *Apluda mutica* , *Andropogon pumilus* , *Dicanthium caricosum* , *D. annulatum* , *Cyanadon dactylion* , *Sacciolepis indica*, *Elusine indica* , *Oplismenus burmani* , . The invasive species like *Lantana camara* , *Ageratum conyzoides* , *Celosia argentiana* , *Parthenium hysterophorus* , *Hyptis saveolense* , *Alternanthera sessalis* , *A. pungense* . **The grasses of Melghat are mostly affected by the invasive species in terms of growth, reproduction , association of grasses in forest of Melghat.**

KEYWORDS : Grasses Melghat tiger reserve , Invasive plants and effect of invasive plants.

Introduction:

Melghat was declared a Tiger Reserve and was among the first nine Tiger Reserves notified in 1973-74 under the Project Tiger. It is located at 21°26'45"N 77°11'50"E 21.44583°N 77.19722°E Coordinates: 21°26'45"N 77°11'50"E 21.44583°N 77.19722°E in northern part of Amravati District of Maharashtra State in India. The Tapti River and the Gawilgadh ridge of the Satpura Range form the boundaries of the Reserve. In 1985 Melghat Wildlife Sanctuary was created. The Tapi river flows through the northern end of the Melghat Tiger Reserve, through a forest which lies within the catchment area of the river system. Many different kinds of wildlife, both flora and fauna, are found here.

Gugamal National Park, which forms the core area of the Reserve, has an area of 361.28 km². carved out in 1987.

At the northern extreme of the Amravati district of Maharashtra, on the border of Madhya Pradesh, lies the Melghat in the South-western Satpura mountain ranges. Melghat means 'meeting of the ghats', which describes the area as a large tract of unending hills and ravines scarred by jagged cliffs and steep climbs.

The Melghat area was declared a Tiger Reserve in 1974. Presently, the total area of the Reserve is around 1677 km². There are no villages in the core area.

The forest is tropical dry deciduous in nature, dominated by teak (*Tectona grandis*). The Reserve is a catchment area for five major rivers: the Khandu, Khapra, Sipna, Gadga and Dolar, all of which are tributaries of the river Tapti. The main fauna found here are tiger, leopard, sloth bear, wild dog, jackal, sambar, gaur, barking deer, nilgai, chital, chausingha, ratel, flying squirrel, wild boar, langur, Rhesus monkey, porcupine, pangolin, mouse deer, python, otter and blacknaped hare

Melghat Tiger Reserve is among the first nine Tiger Reserves situated in the northern part of Amravati district of Maharashtra state. This reserve came into existence in 1974, which lies in Satpura ranges in Vidarbha region and is spread over an area of around 1677 sq. km.

The core area of the reserve, Gugamal National Park covers 361.28 sq. km. area and buffer area of the reserve, the Melghat Tiger Sanctuary covers 788.28 sq. km. The reserve has dry deciduous forests with 41 species of mammals, 250 species of birds, 24 species of fish and 160 species of reptiles and snakes.

Tourists can spot various types of flora including teak, lendia, moyan, ain and many other species. The reserve has 90 species of trees, 66 species of shrubs, 320 species of herbs, 56 species of climbers, 23 sedgespeciesand99grassspecies.

Tiger, leopard, wild dog are some of the animals that can be seen in the reserve. The five rivers that flow from this reserve are Sipna, Khandu, Dolar, Gadga and Khapra which are the tributaries of the main River Tapti. The reserve also has around 61 villages that are inhabited by various tribes including Korku tribe, Gond,Nihal,Balaiandothers.

Methodology :

The topographical and climatological study of the MTR was made for the continuous three years with the help of the metrological instruments . The field study tours were arranged in the forest areas to observe , study and collect the grass plant samples with the help of random quadrate sample plots in the different areas of the forest. The quadrate study is useful to know the palatable and non palatable grasses present in the forest area and also useful to know the non palatable invasive species present in the study area. The plants are collected in the flowering seasons , dried , pressed and mounted on the herbarium sheets. The identification of palatable, non palatable and invasive species is done with the help of local , regional and national level floras. The ecological effects of the invasive species on the grasses of MTR observed , studied and the succession changes are noted.

Observations :

The Melghat tiger reserve has the distribution of more than two hundred grasses , about 65 grasses are palatable for the herbivorous animals , other grasses are non palatable because of the presence of the low moisture and the high percentage of the silica in the vegetative and reproductive parts of the grasses. The forest area also shows

the distribution of the exotic , invasive monocot and dicot plant species. The grasses of the MTR are....

Grasses of Melghat Tiger Reserve

Sr.No.	Botanical name	Common name	Flowering & fruiting season	Palatable /Non Palatable
01	<i>Acrachne recemosa</i>		Aug-sep	Non Palatable
02	<i>Andropogon pumilus</i> Rox			Palatable
03	<i>Apluda mutica</i> L			Palatable
04	<i>Aristida funiculata</i> trin		Aug-Dec	Non Palatable
05	<i>Aristida reducta</i> Stapf		Aug-Dec	Non Palatable
06	<i>Anthraxon lancifolius</i> trin		Aug-Dec	Non Palatable
07	<i>Anthraxon ciliaris</i>			Non Palatable
08	<i>Anthraxon lanceolatus</i> Hochst			Non Palatable
09	<i>Arundinella pumila</i>		Aug-Dec	Non Palatable
10	<i>Bambusa arundinacea</i> Willed			Non Palatable
11	<i>Bothrichloa bladhi</i>			Non Palatable
12	<i>Brachiaria mutica</i>		Aug-Sep	Palatable
13	<i>Brachiaria ramosa</i> L		Aug-Sep	Palatable
14	<i>Brachiaria replans</i> L		Aug-Jan	Palatable
15	<i>Brachiaria eruciformis</i> (JESM)		Aug-Dec	Palatable
16	<i>Cenchrus ciliaris</i> L		Nov-Feb	Palatable
17	<i>Chloris barbata</i>		Aug-Jan	Palatable
18	<i>Chloris virgata</i>		Aug-Jan	Non Palatable

19	<i>Chloris dolichostachya</i>		Aug-Oct	Non Palatable
20	<i>Chloris gyana</i>	Rhodas grass		Non Palatable
21	<i>Chrysopogon fulvus</i>		Sept-Dec	Palatable
22	<i>Coix aquatica</i> Roxb.			Non Palatable
23	<i>Coix gigantea</i> Roxb.			Non Palatable
24	<i>Coix lacryma jobi</i> -L			Non Palatable
25	<i>Cymbopogon martinae</i> Wals	Tikhadi	Sep-Jan	Non Palatable
26	<i>Cynodon dactylon</i> Pears	Durva,Harali	Whole year	Palatable
27	<i>Cynodon barbari</i> Rang		Aug-Dec	Palatable
28	<i>Dactyloctenium aegypticum</i> L		June-Jan	Non Palatable
29	<i>Dactyloctenium indicum</i> Bioss			Non Palatable
30	<i>Dendracalamus strictus</i> Nees	Bamboo		Non Palatable
31	<i>Dicanthium aristatum</i> (Poir)	Marvel.		Palatable
32	<i>Dicanthium nodosum</i> (Willem)	Marvel	Aug-Nov	Palatable
33	<i>Dicanthium annulatum</i> (Forssk)	Marvel		Palatable
34	<i>Dicanthium caricosum</i> (L)	Marvel.	Aug-Jan	Palatable
35	<i>Dicanthium filiculme</i> (Hook-F.)	Marvel.	Sept-Dec	Palatable
36	<i>Digitaria abludens</i> (Roem & schult)		July-Dec	Palatable
37	<i>Digitaria ciliaris</i>		July-Dec	Palatable

38	<i>Digitaria stricta</i>		Aug-Sep	Palatable
39	<i>Dinebra reproflexa</i> (Vahl)		Complete year flowering	Palatable
40	<i>Echinochloa colonum</i> (L)	Pankand	July-Feb	
41	<i>Eleusine glauca</i>	Nachani	Aug-Jan	Palatable
42	<i>Eleusine indica</i> (L)		Aug-Jan	Non Palatable
43	<i>Eragrostiella biferia</i> (Vahl)		Aug-Jan	Non Palatable
44	<i>Eragrostiella coromondeliana</i>		Aug-Jan	Non Palatable
45	<i>Eragrostiella brachylla</i> (Stapf)		Aug-March	Non Palatable
46	<i>Eragrostris major</i> (L)	Ran Poha		Non Palatable
47	<i>Eragrostris cillianensis</i>			Non Palatable
48	<i>Eragrostris japonica</i> (Thunb)		Sep-Dec	Non Palatable
49	<i>Eragrostris tenella</i> (L)			Non Palatable
50	<i>Eragrostris namaquensis</i>			Non Palatable
51	<i>Eragrostris tenuifolia</i>		Sep-Oct	Non Palatable
52	<i>Eragrostris unioloides</i> (Retz)		Aug-Feb	Non Palatable
53	<i>Eragrostris viscosa</i> (Retz)		July-Dec	Non Palatable
54	<i>Eragrostris Minor</i> (Host)		Complete year	Non Palatable
55	<i>Ermepogon foveolatus</i> (Del)	Kadu marvel	July-Dec	Non Palatable
56	<i>Euilalia trispicata</i> (Schult)		Aug-Sep	Non Palatable

57	<i>Heteropogon contortus</i> (L)	Kusal gawat	Sep-Dec	Palatable
58	<i>Imperata cylindrica</i> (L)		Dec-Jan	Palatable
59	<i>Ischaemum pilosum</i> (Klein ex Willd)	Kunda	Sept-March	Palatable
60	<i>Ischaemum rugosum</i>	Ber grass	Aug-Jan	Non Palatable
61	<i>Iseileml laxum</i>	Moshi grass	Aug-Jan	Palatable
62	<i>Melanocenchris jacquemontii</i>		Aug-Dec	Non Palatable
63	<i>Mnesithea granularis</i> (L)	Kangri grass	Aug-Dec	Non Palatable
64	<i>Oplismenus burmannii</i> (Retz)		Aug-Dec	Palatable
65	<i>Oplismenus compositus</i> (L)		Aug-Dec	Palatable
66	<i>Oriyza rufipogon</i> (Griff)		Sep-Jan	Palatable
67	<i>Panicum antilotale</i> (Rtz)		Oct-Jan	
68	<i>Panicum psilopodium</i> (Trin)	Saga	Aug-Oct	Palatable
69	<i>Panicum sumatrense</i> (Roth ex.)	Kutki	Sep-Oct	Palatable
70	<i>Paspalidium flavidium</i> (Retz)		Aug-Dec	Non Palatable
71	<i>Paspalidium jeminatum</i> (Forssk)		Aug-Jan	Non Palatable
72	<i>Paspalum canaroe</i> (Stcut)		Aug-Oct	Non Palatable
73	<i>Paspalum paspalodes</i> (Michx)		Sept-Dec	Non Palatable
74	<i>Pennisetum</i>		Sept-Jan	Palatable in young

	pedicellatum (Trin)			stage not indeginious to Melghat
75	Pennisetum perpureum	Elephant grass	Sep-Nov	Non Palatable
76	Pennisetum americanum (L)	Bajara	Aug-Sept	Palatable
77	Pennisetum orientale			Non Palatable
78	Pseudanthistiria heteroclita (Roxb.)	Fully gavat	Sept-Oct	Palatable
79	Pseudanthistiria hispida (Hook)			Palatable
80	Rottbolia cochinchinensis (Lour)		Aug-Sept	Non Palatable
81	Saccharum spontaneum (L)		Oct-Feb	Non Palatable
82	Sacciolepis indica (Willd)		Sept-Dec	Palatable
83	Sehima nervosum(Rott)		Sept-Dec	Palatable
84	Sehima notatum (Hook)		Aug-Dec	Non Palatable
85	Sehima sulcatum (Hook)		Aug-Dec	Non Palatable
86	Setaria intermedia (Roem)		Aug-Jan	Palatable
87	Setaria tomentosa (Roxb)		Aug-Jan	Palatable
88	Setaria italica (L)	Bhagar	Sept-Nov	Palatable
89	Setaria pumilla (Poir)	Kolu grass	Aug-Jan	Palatable
90	Setaria verticillata (L)	Kutra	Aug-Nov	Palatable
91	Sorghum bicolor			Palatable

92	<i>Sorghum haplense</i>	Barwad		Palatable
93	<i>Sorghum vulgare</i>			Palatable
94	<i>Sporobolus coromandelianus</i> (Retz)		Aug-Dec	Non Palatable
95	<i>Sporobolus indicus</i> (L)		Aug-Dec	Non Palatable
96	<i>Thelepogon elegans</i>		Aug-Jan	Non Palatable
97	<i>Themeda triandra</i>		Sept-Jan	Palatable (Young Stage)
98	<i>Themeda quadrivalvis</i> (L)	Gandhal grass	Aug-Jan	Palatable (Young Stage)
99	<i>Themada australis</i>			Palatable
100	<i>Tripogon jacquemontii</i> (Stapf)		Aug-Jan	Non Palatable
101	<i>Vitivera zizanoides</i> (L)	Khus		Medicinal grass
102	<i>Cymbopogon martinae</i> Wals Var sofia			Medicinal grass
103	<i>Cymbopogon martinae</i> Wals Var motiya			Medicinal grass
104	<i>Zea mays</i>	Maka		Palatable
105	<i>Zoysia japonica</i>			

Invasive species :

A species is invasive when it is **both** nonnative to the ecosystem in which it is found and capable of causing environmental, economic, or human harm. Invasive species often compete so successfully in new ecosystems that they displace native species and disrupt important ecosystem processes. Plants, fish, insects, mammals, birds, and diseases all can be invasive.

The Invasive Species Specialist Group (ISSG) of the Species Survival Commission (SSC) of the World Conservation Union (IUCN) has compiled a list of the One Hundred of the World's Worst Invasive Alien Species (www.issg.org/database/species/search.asp?st=100ss&fr=1&sts=#SpeciesList) which aims to collectively illustrate the range of impacts caused by biological invasion. Although incomplete, this list is a first attempt to rank the impact of alien invasive species. Included in this list are 62 alien invasive species that impact forests and forestry. This annex provides an overview of these species.

Unless otherwise noted, the information in this annex is taken from the Global Invasive Species Database developed by ISSG (www.issg.org/database [accessed on 23 August 2005]).

The MTR and other protected areas of the Maharashtra, inhabited by a variety of invasive species. These species include:

The invasive plant species of the MTR are ..

- 1) *Lantana camara* Family - Verbenaceae
- 2) *Ageratum conyzoides* Family - Asteraceae
- 3) *Vernonia cinera* Family - Asteraceae
- 4) *Alternanthera pungens* Family - Amaranthaceae
- 5) *A. plectranthoides* Family - Amaranthaceae
- 6) *Parthenium hysterophorus* Family - Asteraceae
- 7) *Argemone mexicana* Family - Papaveraceae
- 8) *Stachytarpeta polyandra* Family - Verbenaceae
- 9) *Coolebrookeia oppositifolia* Family - Euphorbiaceae
- 10) *Commelina bengalensis* Family - Commelinaceae
- 11) *Pennisitum pedunculatum* Family - Poaceae

- ▶ Diffuse knapweed, Scotch broom, Himalayan blackberry (plants)
- ▶ Atlantic salmon, European green crab (fish, aquatic invertebrate)
- ▶ Gypsy moth (insect)
- ▶ American bullfrog (amphibian)
- ▶ Nutria (mammal)
- ▶ European starling (bird)
- ▶ White pine blister rust (disease)

Often, invasive species owe their success in colonizing new ecosystems to one or more of the following characteristics:

- ▶ They tolerate a variety of habitat conditions
- ▶ They grow and reproduce rapidly
- ▶ They compete aggressively for resources (like food, water, and nesting sites)
- ▶ They lack natural enemies or pests in the new ecosystem

Simply being nonnative in an ecosystem does not mean that a species will become invasive. It must possess certain characteristics, such as those listed above, that ideally suit it for colonization in a particular area. It also is possible for a species to be invasive in one ecosystem, but non-invasive in another. This can be due to a variety of factors, such as the presence of a predator species or less-than-ideal habitat conditions.

Like invasive species in general, invasive plants possess characteristics that make them especially suited for colonizing new ecosystems. In addition to the characteristics listed above”, these plant-specific characteristics can include invasive plants’ ability to:

- ▶ Produce abundant, easily dispersed seeds that can withstand adverse conditions
- ▶ Reproduce via multiple pathways: roots, stems, and seeds
- ▶ Release chemicals that inhibit the growth of or kill surrounding native plants

Effects of the invasive species on the MTR grasses are

Invasive species can negatively impact ecosystems in a variety of ways. They can:

- ▶ Displace native species
- ▶ Reduce native wildlife habitat
- ▶ Reduce forest health and productivity
- ▶ Alter ecosystem processes
- ▶ Degrade recreation areas

In addition to their negative effects, some invasive species may have positive traits. These traits are often the reason a species that eventually becomes invasive was introduced to an ecosystem in the first place. In addition to growing rapidly and crowding out native plants in the region, the Himalayan blackberry, for example, produces edible berries that are relished by wildlife and people alike. Similarly, though it now threatens to crowd out native plants and increase fire danger, scotch broom, with its bright yellow flowers, was originally planted for beautification and landscaping purposes.

Any positive effect an invasive species might have in an ecosystem can easily be outweighed by the damage it causes. According to the National Invasive Species Information Center, some estimates put the economic cost associated with invasive species damage and control efforts at more than \$100 billion a year in the United States

Management Practices to control the invasive species :

Learn which invasive plants threaten the ecosystems in your area

- ▶ Do not collect invasive plants, their seeds, or reproductive bodies
- ▶ Control invasive plants on your property
- ▶ Manage the growth of ornamental plants on your property
- ▶ Avoid driving or recreating in areas where invasive plants grow
- ▶ Report invasive plant infestations to your local land management agency

Invasive Species Research at PNW Research Station

Scientists with the Pacific Northwest Research Station are conducting studies to better understand invasive species in the region. Their findings will assist natural resource managers as they work to minimize the impact of invasives and limit their spread.

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Bole P.V. & Pathak J.M.(1988) Flora of Saurashtra Part III , Botanical Survey of India.

Annex 2. Select alien invasive species affecting forests and forestry

Invasive.org

<http://www.invasive.org/>

National Invasive Species Information Center

<http://www.invasivespeciesinfo.gov/>

Pacific Northwest Region, Invasive Plant Program

<http://www.fs.fed.us/r6/invasiveplant-eis>

USDA Forest Service, Invasive Species Program

<http://www.fs.fed.us/invasivespecies/>