



**Grassland
Management
Practices in
Melghat Tiger
Reserve:
A Case Study**

Abstract

Melghat Tiger Reserve (MTR), established during 1973-74, has had a long history of scientific management. It is spread over nearly 1677 sq. km. The major vegetation type in the reserve is tropical dry deciduous forest, dominated by teak (*Tectona grandis* L.). As part of habitat improvement programme the management authorities relocated ten villages from the MTR during 2010 -11. The evacuated villages were taken up for development of grassland habitats and removal of alien invasive species. Prior to management intervention systematic studies were conducted on the richness of grass species, successional trends and extent of AIS. This paper summarizes the broad findings of the study along with management recommendations.

Keywords: Alien Invasive Species; Grasses Ecology; Habitat Management; Melghat Tiger Reserve.

Introduction

Melghat Tiger Reserve (MTR) was among the first batch of nine protected areas (PAs) notified under this name during 1973-74. It is located in northern part of Amravati District of Maharashtra State in India. The Tapi River and the Gawilgadh ridge of the Satpura Range form the boundaries of the reserve. The Tapi river flows through the northern end of the MTR. Presently, the total area of the Reserve is 1676.93 sq. km., with 361.28 sq. km. of core and remaining under buffer. Nearly 21 km². of the reserve is under non-forest category that includes agricultural fields and grasslands. Previously, Melghat Sanctuary was created in 1985 with an area of 1597.23 sq. km. Gugamal National Park was carved out of this Sanctuary in 1987. Melghat means 'meeting of the ghats'. The forest is mostly tropical dry deciduous in nature, dominated by teak (*Tectona grandis* L.) that fall under sub-group 5-A 'Southern Tropical Dry Deciduous Forests' (Champion and Seth, 1968).

Melghat Tiger Reserve is characterized by varied topography and soils which provide diverse ecological conditions supporting a large number of plant communities including grasses. Undulating and hilly terrain with poor soil usually support dense patches of grasslands and woodlands. Similarly, plateaus with intensive livestock grazing and past cultivation are also rich in grasses. Distribution of various grassland communities, mechanisms of their nutrient uptake, morphological adaptations, diversification and speciation are important areas for investigation. Taking into account the importance of all grasses, attempts have been made to study their taxonomy, association, distribution, adaptations, diversification and speciation through field survey and laboratory work. A few workers have conducted extensive survey of grassland flora during past 20 years or so (Salunkhe, 1995; Potdar, 2006; Yadav, 2010). Dhore (1988) reported 91 species of grasses from MTR.

As part of habitat improvement programme the management authorities of MTR relocated ten villages from the reserve during 2010-11. The evacuated villages were taken up for development of grassland habitats and removal of alien invasive species. Prior to management intervention systematic studies were conducted on the richness of grass species, successional trends and extent of AIS. A few sites were taken up for the restocking of palatable grasses. This paper deals with the experiences gained and lessons learned on the management of grasslands in the MTR.

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Materials and Methods

Based on the detailed observations and ranking of grasses in terms of their palatability, we propagated highly preferred species in degraded areas. For this purpose a total of 10 sites were taken for grassland by wild ungulates development covering an area of about 2 hectares for sowing of grass seeds, removal of unpalatable herbs such as *Ageratum*, *Argemone*, *Oxalis*, and *Celosia*. Palatable grasses selected for establishment of grass seed banks included: *Dichanthium annulatum*, *D. caricosum*, *D. strictum*, *Iselima laxum*, *I. prostratum*, *Heteropogon contortus*, *Eleusine indica*, *Chloris barbata*, *Chloris virgata*, *Paspaladium flavidum*, *Apluda mutica*, *Cynodon barberi*, *Themeda triandra*, *Sehima nervosum* and *S. sulcatum*. For soil enrichment following native leguminous plants were planted in the area: *Atylosia scarabaeoides*, *Teramnus labialis*, *Rhyncosia minima* var. *minima*, *Rhyncosia minima* var. *laxiflora*, *Sesbania bispinosa*, *Phaseolus radiatus*, *Vigna trilobata* Syn. *Phaseolus trilobus*.

Major findings and Lessons Learned

- I A total of 143 species of grasses were recorded in MTR (Plates 12.1 - 12.5). Of these, 55 species form bulk of the forage for wild ungulates. The dominant grass species in the order of their dominance (cover x abundance) are *Heteropogon contortus*, *Andropogon pumilus*, *Chrysopogon fulvus*, *Themeda quadrivalvis*, *Themeda triandra*, *T. laxa* and *Apluda mutica*. Other species common in heavily trampled and overgrazed areas are *Cymbopogon martini*, *Eragrostis unioides*, *Setaria intermedia* and *Sporobolus diander*.
- ii. The grassland communities in MTR can be broadly divided into two categories, viz., (i) Ephemeral communities comprising mainly of the grasses that complete the life cycle during rainy season or after rainy season. Characteristic species include *Arthraxon lancifolius*, *Arundinella pumila*, *Sporobolus coromandeliana*, and *Digitaria ternata*. (ii) Perennial communities dominated by tussock or rhizomatous species such as *Heteropogon contortus*, *Andropogon pumilus*, *Chrysopogon fulvus*, *Dichanthium caricosum*, and *Pennisitum hohenackeri*.
- iii. Well established grasslands (relatively stable areas) were dominated by species of *Themeda quadrivalvis*, *Heteropogon contortus*, *Ischaemum indicum*, and *Apluda mutica*. Towards higher slopes and undulating areas: *Dichanthium annulatum* and *D. pertusum* were dominant species. Hence it can be stated that *Dichanthium* spp. represent more stable grassland communities in MTR.
- iv. Natural grasslands within the tiger reserve are dominated by the taller grasses such as *Heteropogon contortus*, *Chloris gayana*, *Themeda quadrivalvis*, *Apluda mutica*, *Sehima sulcatum*, *Ischaemum nervosum*, *Ischaemum sulcatum*, *Vetiveria zizanioides*, *Dichanthium caricosum*, *Aristida hystrix* and the intermediate grasses such as *Paspaladium flavedium*, *Chloris gyana*, *Chloris truncata*, *Iselima laxum*, *Imperata cylindrica* and the smaller grasses such as *Chloris barbata*, *Chloris virgata*, *Iselima prostratum*, *Cynodon barberi*, *Cynodon dactylon*, *Dichanthium annulatum*, *Digitaria bicornis*, *Digitaria stricta*, *Brachiaria ramosa*, *Setaria intermedia*, *Setaria verticellata*.
- v. The following Alien Invasive Species (AIS) of plants were recorded in the village relocation sites of MTR: *Alternanthera sessilis*, *Alternanthera pungens*, *Ageratum conyzoides*, *Celosia argentea*, *Argemone mexicana*, *Leucas biflora*, *Hyptis suaveolens*, *Cassia tora*, *Parthenium hysterophorus*, *Sida acuta*, and *Malvastrum coromandelianum*.

Based on experiments done on grassland development in selected areas of MTR following lessons were learned:

- (a) Instead of creating uniform grassland patches, creation of mosaics of grasslands and mixture of browse species in between was much better for round year availability of forage. Hence it is recommended to plant seedlings of certain wild fruit trees in patches. The species recommended for forage enhancement include: *Cordia macleodii*, *Cordia dichotoma*, *Terminalia chebula*, *Terminalia allata*, *Syzygium cumini*, *Zizyphus rugosa*, *Madhuca latifolia*, *Buchanania lanzan*, *Cassia fistula*, *Aegle marmelos*, *Eugenia jambolana*, and *Phyllanthus emblica*. It is recommended that temporary exclosures of wire *Terminalia allata* mesh (upto 5' x 20' x 20') at frequent intervals may be erected for a period of 5- 10 years so as to allow establishment of fruit bearing trees.
- (b) Prior to plantation of palatable grasses all AISS need to be eradicated from the grasslands. The species recommended for plantation in grassland development area include *Dichanthium caricosum*, *Dichanthium Annulatum*, and *Sacciolepis indica*. It is important to create the multi-species stands rather than patches dominated by single species.
- (c) The collection of the seeds of wild legumes in proper period is important. The seed collection should be in the month of November – December.
- (d) Common grasses of MTR along with their palatability index are shown in (Table 12.1).

Table 12.1. Common grass species of MTR and their palatability

S. No.	Botanical name	Flowering and fruiting	Palatability
01	<i>Acrachne racemosa</i>	Aug- Sep	Palatable
02	<i>Andropogon pumilus</i>	Oct	Palatable
03	<i>Apluda mutica</i>	Oct	Palatable
04	<i>Apluda varia</i>	Oct	Palatable
05	<i>Aristida funiculata</i>	Aug-Dec	Non Palatable
06	<i>Aristida reducta</i>	Aug-Dec	Non Palatable
07	<i>Anthraxon lancifolius</i>	Aug-Dec	Non Palatable
08	<i>Anthraxon ciliaris</i>	Oct	Non Palatable
09	<i>Anthraxon lanceolatus</i>	Sept	Non Palatable
10	<i>Arundinella pumila</i>	Aug-Dec	Non Palatable
11	<i>Bambusa arundinacea</i>	--	Non Palatable
12	<i>Bothrichloa bladhii</i>	Jan	Palatable
13	<i>Bothrichloa tuberosa</i>	Dec	Palatable
14	<i>Brachiaria mutica</i>	Aug-Sep	Palatable
15	<i>Brachiaria ramosa</i>	Aug-Sep	Palatable
16	<i>Brachiaria replans</i>	Aug- Jan	Palatable
17	<i>Brachiaria eruciformis</i>	Aug-Dec	Palatable
18	<i>Cenchrus ciliaris</i>	Nov-Feb	Palatable
19	<i>Chloris barbata</i>	Aug- Jan	Palatable
20	<i>Chloris virgata</i>	Aug- Jan	Non Palatable
21	<i>Chloris dolichostachya</i>	Aug-Oct	Non Palatable
22	<i>Chloris gyana</i>	--	Non Palatable
23	<i>Chrysopogon fulvus</i>	Sept-Dec	Palatable
24	<i>Chrysopogon polyphyllus</i>	Dec	Palatable
25	<i>Coix aquatica</i>	Oct	Non Palatable
26	<i>Coix gigantea</i>	Oct	Non Palatable
27	<i>Coix lacryma-jobi</i>	Oct	Non Palatable
28	<i>Cymbopogon martinii</i>	Sept- Jan	Non Palatable
29	<i>Cynodon dactylon</i>	Whole year	Palatable
30	<i>Cynodon barbari</i>	Aug-Dec	Palatable
31	<i>Dactyloctenium aegypticum</i>	June- Jan	Non Palatable
32	<i>Dactyloctenium indicum</i>	Oct	Non Palatable
33	<i>Dendrocalamus strictus</i>	Oct	Non Palatable
34	<i>Dicanthium aristatum</i>	Oct	Palatable
35	<i>Dicanthium nodosum</i>	Aug-Nov	Palatable
36	<i>Dicanthium annulatum</i>	Whole year	Palatable
37	<i>Dicanthium caricosum</i>	Aug- Jan	Palatable
38	<i>Dicanthium filiculme</i>	Sep-Dec	Palatable
39	<i>Digitaria abludens</i>	July-Dec	Palatable
40	<i>Digitaria ciliaris</i>	July-Dec	Palatable
41	<i>Digitaria stricta</i>	Aug-Sep	Palatable
42	<i>Dinebra retroflexa</i>	Oct	Palatable
43	<i>Echinochloa colonum</i>	July-Feb	
44	<i>Eleusine glauca</i>	Aug- Jan	Palatable
45	<i>Eleusine indica</i>	Aug- Jan	Non Palatable

S. No.	Botanical name	Flowering and fruiting season	Palatability
46	<i>Eragrostiella biferia</i>	Aug-Jan	Non Palatable
47	<i>Eragrostiella coromondeliana</i>	Aug-Jan	Non Palatable
48	<i>Eragrostiella brachylla</i>	Aug-Oct	Non Palatable
49	<i>Eragrostris major</i>	Oct	Non Palatable
50	<i>Eragrostris cillianensis</i>	Oct	Non Palatable
51	<i>Eragrostris japonica</i>	Sep-Dec	Non Palatable
52	<i>Eragrostris tenella</i>	Oct	Non Palatable
53	<i>Eragrostris namaquensis</i>	Oct	Non Palatable
54	<i>Eragrostris tenuifolia</i>	Sep-Oct	Non Palatable
55	<i>Eragrostris unioloides</i>	Aug-Feb	Non Palatable
56	<i>Eragrostris viscosa</i>	July-Dec	Non Palatable
57	<i>Eragrostris minor</i>	Whole year	Non Palatable
58	<i>Ermepogon foveolatus</i>	July-Dec	Non Palatable
59	<i>Euilalia trispicata</i>	Aug-Sep	Non Palatable
60	<i>Heteropogon contortus</i>	Sep-Dec	Palatable
61	<i>Heteropogon melanocarpon</i>	Nov	Palatable
62	<i>Imperata cylindrica</i>	Dec-Jan	Palatable
63	<i>Ischaemum pilosum</i>	Sept-Mar	Palatable
60	<i>Ischaemum rugosum</i>	Aug-Jan	Non Palatable
64	<i>Iseilema laxum</i>	Aug-Jan	Palatable
65	<i>Iseilema prostratum</i>	Dec	Palatable
66	<i>Melanocenchris jacquemontii</i>	Aug-Dec	Non Palatable
67	<i>Mnesithea granularis</i>	Aug-Dec	Non Palatable
68	<i>Oplismenus burmannii</i>	Aug-Dec	Palatable
69	<i>Oplismenus compositus</i>	Aug-Dec	Palatable
70	<i>Oryza rufipogon</i>	Sep-Jan	Palatable
71	<i>Panicum antilotale</i>	Oct-Jan	
72	<i>Panicum psilopodium</i>	Aug-Oct	Palatable
73	<i>Panicum sumatrense</i>	Sep-Oct	Palatable
74	<i>Paspalidium flavidium</i>	Aug-Dec	Non Palatable
75	<i>Paspalidium jeminatum</i>	Aug-Jan	Non Palatable
76	<i>Paspalum canare</i>	Aug-Oct	Non Palatable
77	<i>Paspalum paspalodes</i>	Sept-Dec	Non Palatable
78	<i>Pennisetum pedicellatum</i>	Sept-Jan	Palatable at
79	<i>Pennisetum perpureum</i>	Sep-Nov	Non Palatable
80	<i>Pennisetum americanum</i>	Aug-Sept	Palatable
81	<i>Pennisetum orientale</i>	-----	Non Palatable
82	<i>Pseudanthistiria heteroclita</i>	Sept-Oct	Palatable
83	<i>Pseudanthistiria hispida</i>	Oct	Palatable
84	<i>Rottbolia cochinchinensis</i>	Aug-Sept	Non Palatable
85	<i>Saccharum spontaneum</i>	Oct-Feb	Non Palatable
86	<i>Sacciolepis indica</i>	Sept-Dec	Palatable
87	<i>Sehima nervosum</i>	Sept-Dec	Palatable
88	<i>Sehima notatum</i>	Aug-Dec	Non Palatable
89	<i>Sehima sulcatum</i>	Aug-Dec	Non Palatable
90	<i>Setaria intermedia</i>	Aug-Jan	Palatable
91	<i>Setaria tomentosa</i>	Aug-Jan	Palatable

S. No.	Botanical name	Flowering and fruiting season	Palatability
92	<i>Setaria italica</i>	Sept-Nov	Palatable
93	<i>Setaria pumilla</i>	Aug-Jan	Palatable
94	<i>Setaria verticillata</i>	Aug-Nov	Palatable
95	<i>Sorghum bicolor</i>	Oct	Non Palatable
96	<i>Sorghum halepense</i>	Oct	Non Palatable
97	<i>Sorghum vulgare</i>	Oct	Non Palatable
98	<i>Sporobolus coromandelianus</i>	Aug-Dec	Non Palatable
99	<i>Sporobolus indicus</i>	Aug-Dec	Non Palatable
100	<i>Thelepogon elegans</i>	Aug-Jan	Non Palatable
101	<i>Themeda triandra</i>	Sept-Jan	Palatable (Young Stage)
102	<i>Themeda quadrivalvis</i>	Aug-Jan	Palatable (Young Stage)
103	<i>Themeda australis</i>	Oct	Palatable
104	<i>Themeda laxa</i>	Oct	Palatable
105	<i>Tripogon jacquemontii</i>	Aug-Jan	Non Palatable
106	<i>Vitivera zizanioides</i>	Nov-Dec	Medicinal grass
107	<i>Cymbopogon martinii</i>	Oct	Medicinal grass
108	<i>Zoysia japonica</i>	Sept	Non Palatable



Plate 12.1: *Sehima nervosum*

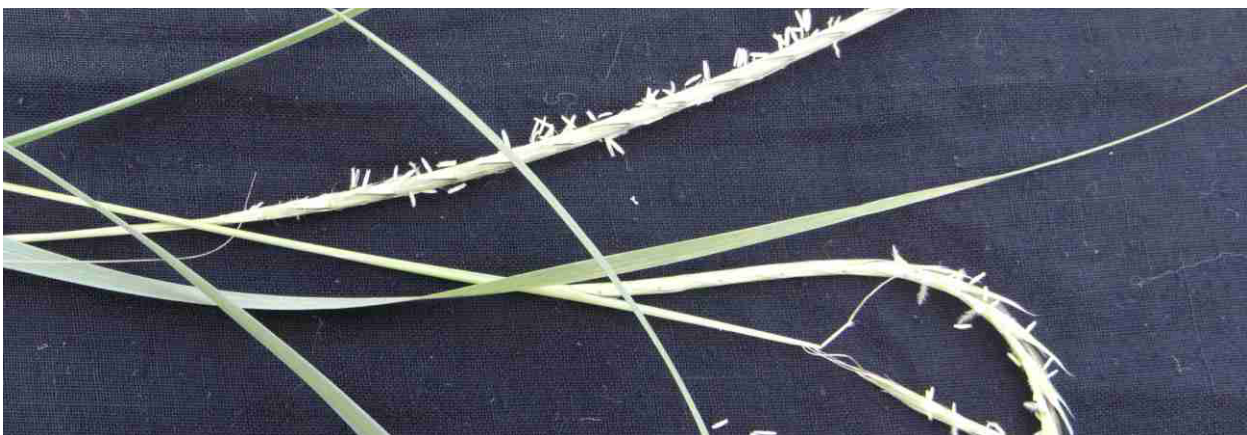


Plate 12.2: *Sehima sulcatum*



Plate 12.3: *Brachiaria mutica*



Plate 12.4: *Themeda triandra*

Acknowledgement

The authors are thankful to the PCCF (Wildlife) Maharashtra State and CCF and Field Director Melghat Tiger Reserve, Amravati M.S., for giving us the opportunity to carry out the field work in Rehabilitated areas of the tiger reserve. We are thankful to Mr. K. P. Singh, Ex. Chief Conservator of Forests and Field Director Melghat Tiger Reserve, Amravati for necessary help and encouragement during my work.

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