



Phonological Study of grasses of Melghat Tiger Reserve, Amravati, Maharashtra State, India

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Abstract

A grass is taxonomically defined as any species within the large family (Poaceae) of monocotyledonous plants having narrow leaves, hollow stems, and clusters of very small, usually windpollinated flowers. Grasses include many varieties of plants grown for food, fodder, and ground cover (Grass 2014). Phenological study of grasses includes the study of the timing of regular biological events, like grasses flowering, and the processes that alter their timing. Phenological stages: Stages during plant growth that are a distinct phase of the plant's development. The grasses of Melghat Tiger Reserve are annual, perennial, soft and course distributed in all natural and artificial man made grasslands after rehabilitation of villages. In Melghat Tiger Reserve total 90 grasses phenological study carried out in this field work. There are 15 grass genera and species which are wild relatives of grasses. The present study comprises phenological study of grasses includes germination of grass seeds, vegetative growth changes, flowering and fruiting of grasses of MTR.

Key Words : Phenolgy Grasses, Melghat Tiger Reserve.

Introduction :

Grasses are one of the largest and most valuable groups of flowering plants, consisting of 610 genera and 10,000 species (Cope, 1982). Clayton and Renvoize (1986) put the total number of grasses in the world about 10,000 species, 651 genera were recognized and assigned numbers indicating their phylogenic status based upon various evidences. It ranks third in number of genera after the Compositeae and Orchidaceae and fifth in number of species after the Asteraceae, Orchidaceae, Leguminoseae and Rubiaceae (Good, 1953). Grasses are widespread than any other family of flowering plants. The great adaptability of different species has enabled them to thrive under the most varied conditions. They form the climax vegetation of the semiarid prairies of the American continent, the steppes of Asia and the savannas of Africa. Grasses exceed all other in the importance of its products.



It provides food in the form of cereals for man and forage for most animals. Many species of native and introduced grasses are utilized in improved pastures (Salter, 1952).

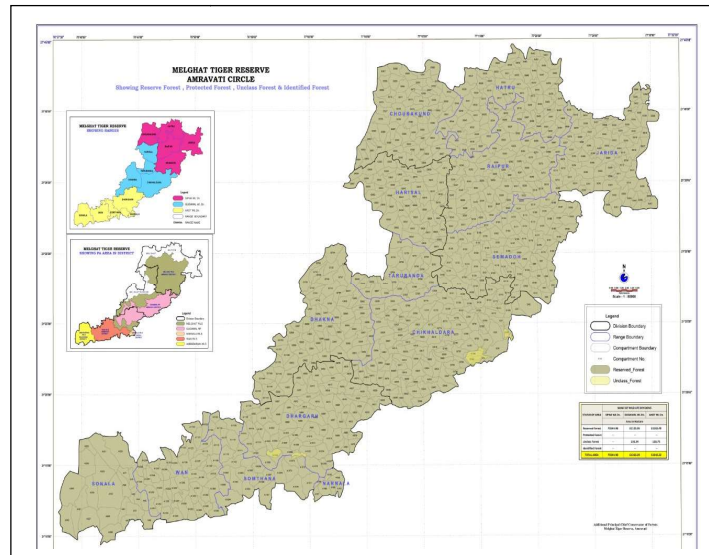
Almost all animal species and food chains depend on grass because grass occurs across the world and is almost always edible. The groups of animals that depend most directly on grass for food are birds, insects, rodents, and grazers. Grass provides the only food source for seed-eating birds, and the birds play an integral role in seed dispersal. Insects use grass for both food and shelter. Disruption of these grassland ecosystems can cause a dangerous under or overabundance of insect species. Rodents consume grass seeds or the base of the plant where the most nutrients are stored. Grazers have the largest impact on grasslands and typically graze in large herds which makes spatially expansive impact. Grazers remove old plant material, stimulate new growth, and provide nutrients in the form of manure. Although predators and decomposers are also ultimately dependent on grass species, it is primary consumers specifically herbivores- that have the biggest causal relationship with grass species. Herbivores and grass species composition are highly interdependent. Evaluating a Grassland There are four main measures to evaluate a grassland: grazing value, ecological indicator status, succession stage, and perenniality. Several factors that can help conservation managers determine whether their area is providing valuable grazing material. By identifying grass species in the area, grazing value can be determined. Grazing value is defined as the quality and quantity of material from an individual available for grazing (Van Oudtshoorn 2009).

Melghat Tiger Reserve :

Melghat is among the first nine tiger reserves of India to be notified in 1973 under Project Tiger. It is located at 21°26'45"N 77°11'50"E Coordinates: 21°26'45"N 77°11'50"E in the northern part of Amravati District of Maharashtra. Melghat Wildlife Sanctuary was declared as in 1985. The Tapti River flows through the northern part of Melghat Tiger Reserve, and forms the boundary of the reserve together with the Gawilgad ridge of the Satpura Range.

The Meghat Tiger Reserve divided in to The area has been divided into three Wildlife Divisions; namely Sipna Wildlife Division, Paratwada, Gugamal Wildlife Division Paratwada and Akot Wildlife Division Akot. Entire area of the Reserve including the area of Wan, Ambabarwa and Narnala sanctuaries . Presently, the total area of the reserve is around 1677 km². In Sipna and Gugamal Wildlife Division, there are more than 10 villages in the core area. In Akot wildlife Division, there are no villages in core area. All villages are rehabilitated in akot wildlife division. The forest is tropical dry deciduous in nature,

dominated by teak (*Tectona grandis* L.). The reserve is a catchment area for five major rivers: the Khandu, Khapra, Sipna, Gadga and Dolar. These all rivers are tributaries of the river Tapti.



Objectives

- Identification and Enumeration of grass flora of Melghat Tiger Reserve.
- To identify the grass plants from open grasslands with the help of morphological study by using regional floras.
- Exploration of grass flora from Melghat Tiger Reserve.
- To determine diversity of grass plants and its ecological significance in forest ecosystem.
- Grasses association in grassland ecosystem .
- Enumeration and documentation of grasses with reference to GPS co-ordinates, Phenological study.

Material and Method :

Study area (Melghat Tiger Reserve)

All grasslands of Core Area of Melghat Tiger Reserve : Gugamal Wildlife Division : Vairat, Churni, Kund, Koha, Pastalai, Memna, Dhakana range, Harisal Range . Sipna Wildlife Division: Semadoh, Pili, Raipur, Jarida Range Grasslands. Akot wildlife Division : Dhargad, Amona, Somthana, Gullarghat, Bori, Nagartash, Barukheda.

Data Collection: Floristic : Extensive and repeated field surveys are carried out in the study area, covering three predominant seasons and for a period of 2- 3 years, from 2021



document the species richness of grasses from study area. The grasses plant species are photographed in the field using DSLR camera with GPS locations. A comprehensive list of grasses occurring in grasslands of Melghat Tiger Reserve prepared grasses classification into palatable and non palatable, annual, perennial, terrestrial prepared. During field visits, focus given to document habitat, phenology and association on grassland, composition of grassland.. Morphological characters recorded of grass specimens. The morphological characters, of the grasses, arrangement of floral parts, habit, habitat and locality will be recorded carefully in field note book.

The collection of grasses from the different localities of the forest areas and systematic study of grasses and their uses by the local peoples of the Tadoba forest area.. Nomenclature of each taxon will be checked under the rules of International Code of Botanical Nomenclature. A map of the area with the important places of collection is given. Detailed morphological studies carried down under dissecting microscope and different morphological characters observed and their identification confirmed by flora of Maharashtra (B.D. Sharma & S. Kartikeyan,2001) Flora of British India (J.D. Hooker, 1998).

Morphological study:1. Plants collection from selected sites 2. Morphological study under dissection microscope 3. Plants classification 4. Ecological study 5. Ecological significance 6.. Lat. long study with GPS. Herbarium samples examined through the conventional taxonomical procedure adopted by Bentham and Hooker (1873) and Prain (1903).

Observations :

In Melghat Tiger Reserve there is diversity of soil, landscape, topography, rainfall, temperature, humidity and grasses. The composition of grasslands is also variable.

The grasslands composition in Melghat Tiger Reserve

Taller grasslands of MTR: *Themeda quadrivalvis*, *Heteropogon contortus*, *Apluda mutica*, *Schiema nervosum*, *Dicanthium caricosum*.

Intermediate grasslands: *Dicanthium annulatum*, *Paspaladium flavedium*, *Sporobolus gigantean*, *Eragrostris unioloides*, *Digitaria stricta*, *Setaria pumilla*.

and grasslands the phenological data of grasses is given as under.



Sr. No.	Botanical name	Common name	Flowering season	fruiting season	Seeds germination period	Leaf primordia formation season
01	<i>Acrachne recemosa</i>		August	October	July	July -August
02	<i>Andropogon pumilus</i> Rox		Sept	Nov	July	July
03	<i>Apluda mutica</i> L	Moti tura	Sept	Nov	July	July -Aug
04	<i>Aristida funiculata</i> trin	Zadu grass	Aug-Dec	Oct	Dec	July
05	<i>Aristida reducta</i> Stapf	Zasu grass	Aug-Dec	Oct	Dec	July
06	<i>Anthraxon lancifolius</i> trin	Chakarpatti	Oct	Dec	July	July
07	<i>Bothrichloa bladhi</i>	Vaidya gawat	Nov	Dec	Aug	Aug
08	<i>Brachiaria mutica</i>	Sawa gawat	Sep	Dec	July	July
09	<i>Brachiaria ramosa</i> L	Sama, sawa gawat	Sep	Dec	July	July
10	<i>Brachiaria repans</i> L	Sawa gawat	Aug-Jan	Dec	July	July
11	<i>Brachiaria eruciformis</i> (JESM)	Sawa	Aug-Dec	Dec	July	July
12	<i>Bothriochloa tuberosa</i>	Vaidya	Nov	Dec	July	Aug
13	<i>Chloris barbata</i>	Gondali gawat	Aug-Jan	Nov – Feb	July	July
14	<i>Chloris virgata</i>	Gondali	Aug-Jan	Dec	July	July
15	<i>Chloris dolichostachya</i>	Sikka gawat	Oct	Dec	July	July
16	<i>Chloris gyana</i>	Lahan sika gawat	Nov	Jan	July	July
17	<i>Coix lacryma jobi</i> -L	Ran jondhali	Nov	Dec –Jan	Sept	Sept
18	<i>Cymbopogon martiniae</i> Wals	Tikhadi	Sept	Dec	July	July
19	<i>Cynodon dactylon</i> Pears	Durva, Harali	Oct	--	---	Propagate by rhizome/runner
20	<i>Dactyloctenium aegypticum</i> L	Crow foot grass	Nov	Dec	July	July
21	<i>Dactyloctenium indicum</i> Bioss	Crow foot grass	Nov	Dec	July	July
22	<i>Dendracalamus strictus</i> Nees	Bamboo	Dec	March – April	Aug	Aug
23	<i>Dicanthium aristatum</i> (Poir)	Marvel.	Oct	Nov	July	July
24	<i>Dicanthium annulatum</i> (Forssk)	Marvel	Oct to Feb	Nov – Dec.	July	July / vegetative propagation
25	<i>Dicanthium caricosum</i> (L)	Marvel.	Oct to Feb	Oct to Feb	July	July/ vegetative propagation
26	<i>Digitaria abludens</i> (Roem & schult)	Ravi gawat	Sept	Nov.	July	July
27	<i>Digitaria stricta</i>	Ravi gawat	Sept	Nov	July	July
	<i>Dimeria blatterii</i>	Harin shingi gawat	Oct	Nov.	July	July
28	<i>Eragrostris major</i> (L)	Ran Poha	Sept	Nov.	June	June



Sr. No.	Botanical name	Common name	Flowering season	fruiting season	Seeds germination period	Leaf primordia formation season
29	<i>Eleusine glauca</i>	Nachani	Oct	Nov -Dec	July	July
30	<i>Eleusine indica (L)</i>	Jangli nachni	Oct	Nov. – Dec.	July	July
31	<i>Eragrostiella biferia (Vahl)</i>		Oct	Dec	July	July
32	<i>Eragrostiella coromondeliana</i>		Sept	Oct	July	July
33	<i>Eragrostiella brachylla (Stapf)</i>		Sept	Oct	July	July
34	<i>Eragrostris major (L)</i>	Ran Poha	Sept	Oct	July	July
35	<i>Eragrostris cillianensis</i>		Sept	Oct	July	July
36	<i>Eragrostris japonica (Thunb)</i>		Sept	Oct	July	July
37	<i>Eragrostris tenella (L)</i>		Sept	Oct	July	July
38	<i>Eragrostris namaquensis</i>		Sept	Oct	July	July
39	<i>Eragrostris tenuifolia</i>	Chimanchara	Sept	Oct	July	July
40	<i>Eragrostris unioloides (Retz)</i>	Ran poha	Sept	Oct	July	July
41	<i>Eragrostris viscosa (Retz)</i>		Sept	Oct	June	July
42	<i>Eragrostris Minor (Host)</i>	Bhurbhusi	Sept	Oct	June	July
43	<i>Heteropogon contorpus (L)</i>	Kusal gawat	Oct	Dec	July	July
44	<i>Imperata cylindrica (L)</i>	Dhab gawat	Jan	Feb	July	July
45	<i>Ischaemum pilosun (kleinex.willd)</i>	Kunda	Nov	Dec –Jan	July	July
46	<i>Ischaemum rugosum</i>	Ber grass	Oct	Nov -Dec	July	July
47	<i>Iseilema laxum</i>	Moshan grass	Oct	Dec	July	July
48	<i>Iselima prostratum</i>	Moshan gawat	Oct	Dec	July	July
49	<i>Oplismenus burmannii (Retz)</i>	Futana gawat	Oct	Nov	July	July
50	<i>Oriyza rufipogon (Jriff)</i>	Wild dhan	Oct	Dec	July	July
51	<i>Panicum antilotale (Rtz)</i>		Oct	Nov	July	July
52	<i>Panicum psilopodium (Trin)</i>	Kutki	Oct	Nov	July	July
53	<i>Panicum sumatrense (Roth ex.)</i>	Kutki	Oct	Nov	July	July
54	<i>Paspalidium flavidium (Retz)</i>	Bodila gawat	Oct	Nov	July	July
55	<i>Paspalum canare (Stcut)</i>	Kodo	Oct	Dec	July	July



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56	<i>Paspalum paspalodes (Michx)</i>	Kodo	Oct	Dec	July	July
57	<i>Pennisetum pedicellatum (Trin)</i>	Deenanth gawat	Oct	Dec	July	July
58	<i>Rottbolia cochinchinensis (Lour)</i>		Oct	Dec	July	July
59	<i>Saccharum spontaneum (L)</i>	Kans gawat	Oct	Dec.	June	June – July
60	<i>Sacciolepis indica (Willd)</i>		Nov	Dec.	July	July
61	<i>Sehima nervosum (Rott)</i>	Pawanya gawat	Oct	Nov.	July	July
62	<i>Setaria intermedia (Roem)</i>	Ran bajra	Sept	Nov.	June	July
63	<i>Setaria tomentosa (Roxb)</i>	Ran bajra	Sept	Nov.	June	July
64	<i>Setaria italica (L)</i>	Bhagar	Sept	Nov.	June	July
65	<i>Setaria pumilla (Poir)</i>	Kolu grass/ ran bajra	Sept	Nov.	June	July
66	<i>Setaria verticillata (L)</i>	Chikta	Sept	Nov.	June	July
67	<i>Sorghum haplense</i>	Barwad	Oct	Dec.	July	July
68	<i>Sporobolus coromandelianus (Retz)</i>	Bhubhusi	Aug	Oct	June	July
69	<i>Sporobolus indicus (L)</i>	Bhurbhusi	Aug	Oct	June	July
70	<i>Themeda quadrivalvis (L)</i>	Gonyad	Oct.	Dec	July	July
71	<i>Tripogon jacquemontii (Stapf)</i>	Tifati	Oct.	Nov.	July	July
72	<i>Vitivera zizanioides (L)</i>	Khus	Nov.	Jan	July –Aug.	Aug.
73	<i>Cymbopogon martiniae Wals Var sofia</i>	Tikhali	Nov.	Jan.	June	June –July
74	<i>Schiema sulcatum</i>	Pawanya gawat	Oct	Dec	July	July
75	<i>Mensthia granularis</i>		Oct	Nov	July	July
76	<i>Themeda triandra</i>	Gondhali lahan	Oct	Nov.	July	July
77	<i>Themeda laxa</i>	Gondhali mothi	Nov	Dec	July	July
78	<i>Sorghum bicolor</i>	Wild jawar	Nov	Jan	July	July
79	<i>Oplismenus compositus</i>	Futana gawat	Nov	Dec	July	July
80	<i>Rotbolia exaltata</i>		Nov	Dec	July	July
81	<i>Heteropogon melanoxydon</i>	Kusali gawat	Nov	Dec.	July –June	July
82	<i>Aristida hystrax</i>	Zadu gawat	Oct	Dec	July	July



Sr. No.	Botanical name	Common name	Flowering season	fruiting season	Seeds germination period	Leaf primordia formation season
83	<i>Anthraxon lancifolius trin</i>		Oct	Dec	July	July
84	<i>Anthraxon ciliaris</i>		Oct	Dec	July	July
85	<i>Anthraxon lanceolatus Hochst</i>		Oct	Dec .	July	July
86	<i>Arundinella pumila</i>		Oct	Nov	July	July
87	<i>Bambusa arundinacea Willd</i>		Nov	Feb - Mar	July	Aug
88	<i>Thelepogon elegans</i>	Bangdi gawat	Oct	Dec	July	July
89	<i>Arundo donax</i>	Bansari gawat	Nov	Jan	Vegetative propagation	
90	<i>Melanocenchrus jacquemintii</i>		Sept	Nov	June	July

Result and discussion:

Grasses flowering mostly started from October to November exceptionally some species of *Setaria*, *Sporobolus* and *Eragrostris* like *Setaria pumilla*, *S. italica*. The species of *Imperata* shows late flowering in January Flowering in grasses is the reproductive stage generally from observations environmental factors like temperature, humidity plays important role in flowering season of grasses. Mostly annual grasses show early flowering as compare to perennial grasses in Protected Areas of Central India.. The grasses growing on hard strata of soil, sand, rocks shows early flowering. The phenological characters of grasses like growth – vegetative and reproductive growth, seeds germination, leaf primordia, leaf radical, culm formation, flowering, seeds formation, seeds maturity, seeds germination depends upon temperature, humidity and edaphic factors.

Conclusion:

The vegetative and reproductive growth of grasses in forest areas specially seeds germination, flowering and seeds maturation plays important role in grassland management. The seeds maturity, seeds collection of fodder grasses are useful for enrichment of desired grasses useful for herbivores and grass seeds are useful for ecological restoration of degraded and over grazed grassland. The temperature range in melghat tiger reserve in Sipna and gugamal wildlife division is similar with reference to the ecological and environmental conditions the flowering season of grasses is similar but in Akot Wildlife Division the flowering of grasses is earlier as compare to the Sipna and Gugamal Wildlife Division. The phenological characters are important in Protected Areas for Wildlife habitat management.



Acknowledgement:

Author are very much thankful to Field Director and Deputy Director of Melghat Tiger Reserve, Amravati Maharashtra State for permission to carry out phenological and morpho taxonomical study of grasses.

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