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PHENOLOGICAL STUDY OF GRASSES OF TADOBA ANDHARI TIGER RESERVE, CHANDRAPUR, MAHARASHTRA STATE, INDIA

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ABSTRACT:
"Tadoba" is taken from the name of the god "Tadoba" or "Taru", worshipped by the tribes who live in the dense forests of the Tadoba and Andhari region, while "Andhari" refers to the Andhari river that meanders through the forest. Tadoba Andhari Reserve is the largest national park in Maharashtra. The total area of the reserve is 625.4 square kilometres (241.5 sq mi). This includes Tadoba National Park, with an area of 116.55 square kilometres (45.00 sq mi) and Andhari Wildlife Sanctuary with an area of 508.85 square kilometres (196.47 sq mi). The reserve also includes 32.51 square kilometres (12.55 sq mi) of protected forest and 14.93 square kilometres (5.76 sq mi) of uncategorised land.Tadoba National Park and Andhari wildlife sanctuary together form the Tadoba-Andhari Tiger Reserve. The total area of the Tadoba-Andhari tiger reserve is about 1,727 km^2. Tadoba National Park was established in the year of 1955. Total area of the park is 116.55 Km^2 .The Andhari Wildlife Sanctuary was formed in the year 1986. Total area of the Andhari Wildlife Sanctuary is 508.85 Km^2.
A grass is taxonomically defined as any species within the large family (Gramineae or Poaceae) of monocotyledonous plants having narrow leaves, hollow stems, and clusters of very small, usually wind pollinated 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 Tadoba Andhari Tiger Reserve are annual, perennial, soft and course distributed in all natural and artificial man made grasslands after rehabilitation of villages. TATR grasses are with 59 genera and 74 species. 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 TATR.

Keywords:- *Phenology Grasses , TATR.*

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 Compositae and Orchidaceae and fifth in number of species after the Compositae, Orchidaceae, Leguminoceae 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(Kellogg E A (2001). Grasses exceed all other in the importance of its products. It provides food in the form of

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cereals for man and forage for most animals. Many species of native and introduced grasses are utilized in improved pastures (Salter, 1952). A grass is taxonomically defined as any species within the large family (Gramineae or Poaceae) of monocotyledonous plants having narrow leaves, hollow stems, and clusters of very small, usually wind pollinated flowers. Grasses include many varieties of plants grown for food, fodder, and ground cover (Grass 2014). Grasses are often confused with sedges (Cyperaceae family) and reeds (Restionaceae family. However, sedges do not have a leaf sheath and their leaves are attached directly to the culm—a diagram of grass anatomy is provided in Appendix C. The culms of sedges are also angular, while grass culms are circular. The grass family is the fifth largest plant family on earth with over 700 genera and 9700 species. About ten percent of the grass species worldwide can be found in southern and tropical Africa; the major genera of which are Eragrostis, Pentaschistis, Panicum, Sporobolus, Aristida, Digitaria, Stipagrotis, Setaria, Brachiaria, and Hyparrhenia (Van Oudtshoorn 2009).

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. There are many bird species, such as Quelea finches, the most common bird on earth with a population of over 1.5 billion in Africa alone, that solely eat grass seeds. 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 perennially. 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).

Tadoba Andhari Tiger Reserve Forest Diversity :

"Tadoba" is taken from the name of the god "Tadoba" or "Taru", worshipped by the tribes who live in the dense forests of the Tadoba and Andhari region, while "Andhari" refers to the Andhari river that meanders through the forest. Tadoba Andhari Reserve is the largest national park in Maharashtra. The total area of the reserve is 625.4 square kilometres (241.5 sq mi). This includes Tadoba National Park, with an area of 116.55 square kilometres (45.00 sq mi) and Andhari Wildlife Sanctuary with an area of 508.85 square kilometres (196.47 sq mi). The reserve also includes 32.51 square kilometres (12.55 sq mi) of protected forest and 14.93 square kilometres (5.76 sq mi) of uncategorised

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land.Tadoba National Park and Andhari wildlife sanctuary together form the Tadoba-Andhari Tiger Reserve. The total area of the Tadoba-Andhari tiger reserve is about 1,727 km2 . Tadoba National Park was established in the year of 1955. Total area of the park is 116.55 Km2 .The Andhari Wildlife Sanctuary was formed in the year 1986. Total area of the Andhari Wildlife Sanctuary is 508.85 Km2 . Total core area of the tiger reserve is 625.40 Km2 . Total buffer area of the tiger reserve is 1101.60 Km2 . The reserve also includes 32.51 Km2 of protected forest and 14.93 Km2 of other areas. The monsoon season begins in June; the area receives heavy rainfall during this season (approx.1275 mm) and humidity around 66-70%. Tadoba Andhari Tiger Reserve is a predominantly southern tropical dry deciduous forest with dense woodlands comprising about eighty seven per cent of the protected area. Teak is the predominant tree species. Other deciduous trees found in this area include ain (crocodile bark), bija, dhauda, salai, semal and tendu. Beheda, hirda, karayagum, mahua madhuca (crepe myrtle), palas (flame-of-the-forest, Butea monosperma) and Lannea coromandelica (wodier tree). Axle wood (Anoge issuslatifolia, a fire-resistant species), black plum and arjun are some of the other tropical trees that grow in this reserve. Aside from the keystone species, the Bengal tiger, Tadoba Tiger Reserve is home to ther mammals, including: Indian leopards, sloth bears, gaur, nilgai, dhole, striped hyena, small Indian civet, jungle cats , sambar, barking deer, chital, chausingha and honey badger . Tadoba lake sustains the marsh crocodile, which was once common. Indian star tortoise, Indian cobra and Russel's viper also live in Tadoba. The lake contains a wide variety of water birds, and raptors. 195 species of birds have been recorded, including three endangered species. The grey-headed fish eagle, the crested serpent eagle, and the changeable hawkeagle are some of the raptors seen in the park. Poaceae is the one of the largest family among the monocotyledons in the world .The grass vegetation broadly divided into two types depending upon their life-span, Ephemeral vegetation consisting mainly of the grasses that complete the life cycle during rainy season or after rainy season. Grasses autumn or long lived vegetation with species that grow with the rains but complete their life-cycle after rains. The species like *Arthraxon lancifolius, Arundenella pumila, Sporobolus coromondelianus* , are the chief components of farmers category. On the conterary the species like *Heteropogon contortus, Andorpogon pumulus, Chrysopogon fulvus, Dicanthium caricosum, Setaria pumilla* which form the autumn vegetation are either perennial vegetation forming large tufts. (Kangxin Li and et al (2020)

Tadoba-Andhari National Park/Coordinates 20.2484° N, 79.3607° E

OBJECTIVES

- Identification and Enumeration of grasses of TATR.
- To identify the grasses from grasslands with the help of morphological study.
- Exploration of grass flora from TATR.
- Grasses association in grassland ecosystem.

  Enumeration, documentation and phenological study of grasses

MATERIAL & METHODS:

Study area (Tadoba Andheri Tiger Reserve)

All grasslands of Core Area , Kolara Range grasslands , Tadoba Range Grasslands , Mohrli Range Grasslands , Karwa Range and Kolsa Range Grasslands

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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 Tadoba Andhari Tiger Reserve prepared grasses classification into palatable and non-palatable , annual , perennial , terrestrial , aquatic and amphi-terresrtrial 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 TATR grasses growing indifferent habitats like open grassland (Light tolerant) , occurring in shady areas (Shade tolerant) , growing in water body (Moist areas) . Grasses also shows distribution in different types of soil (Black , red , mixed color) texture of soil also variable sand , silt , loam and clay. The phenological data with reference to annual, perennial, flowering, fruiting and reproduction id illustrated as Table-2.

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 (Schmidt R J, Ambrose B A (1998) 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 like Vitiver , *Saccharum* growing in amphi-terrestrial habitat are perennial show variation in flowering . The grasses growing on hard strata of soil, sands , 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

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plays important role in grassland management practices specially in Protected Areas of India.. 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 phenological characters are important in Protected Areas for Wildlife habitat management grazing , breeding , nesting , hiding habitats of herbivores..

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REFERENCES:

Ayyangar G N R (1934) Recent work on the genetics of millets in India. Madras Agricultural Journal 22 (1), 16-26

Bor N L (1960) The Grasses of Burma, Ceylon, India and Pakistan (excluding Bambusease) (Vol I), Pergamon Press, London, UK, 767 pp

Champion, H. G. 1936. *A preliminary survey of the forest types of India and Burma.* Indian For. Rec.

Champion, H. G. and Seth, S. K. 1968. *A revised survey of the forest types of India.* Manager of Publications, Delhi.

Gupta A, Mahajan V, Kumar M, Gupta HS (2009) Biodiversity in the barn-yard millet (*Echinochloa frumentacea* Link: Poaceae) germplasm in India. Genetic Resources and Crop Evolution 56 (6) , 883-889

Kellogg E A (2001) Evolutionary history of the grasses. Plant Physiology 125,1198-1205.

Kosina R (2010) On the leafy nature of lodicules in the genus Triticum (Poaceae). Botanical Journal of Linnean Society 164 (3) , 303-316

Schmidt R J, Ambrose B A (1998) The blooming of grass flower development, Current Opinion in Plant Biology 1 (1) , 60-67

Vegetti C, Anton A M (2000) The grass inflorescence. In: Jacobs SWL, Everett J (Eds) Grasses: Systematics and Evolution , CSIRO publishing, Melbourne, Australia, pp 29-31

Watson L, Dallwitz M J (1999) The grass genera of the world: Descriptions ,illustrations, identification, and information retrieval; including synonyms ,morphology, anatomy, physiology, phyto chemistry, cytology, classification, pathogens, world and local distribution, and references. Available online:http://delta-intkey.com.

Hossein Arzani and M. Zohadi (2009)Phenological Effects on Forage Quality of Five Grass Species:, Rangeland Ecology & Management 57(Nov 2004):624-629

Richard B. Primak and Ammanda S.Gallinat (2017) Insights into grass phenology from herbarium specimens. https://doi.org/10.1111/nph.14439

Kangxin Li and et al (2020) Diversity of Reproductive Phenology Among Subtropical Grasses Is Constrained by Evolution and Climatic Niche. https://doi.org/10.3389/fevo.2020.00181.

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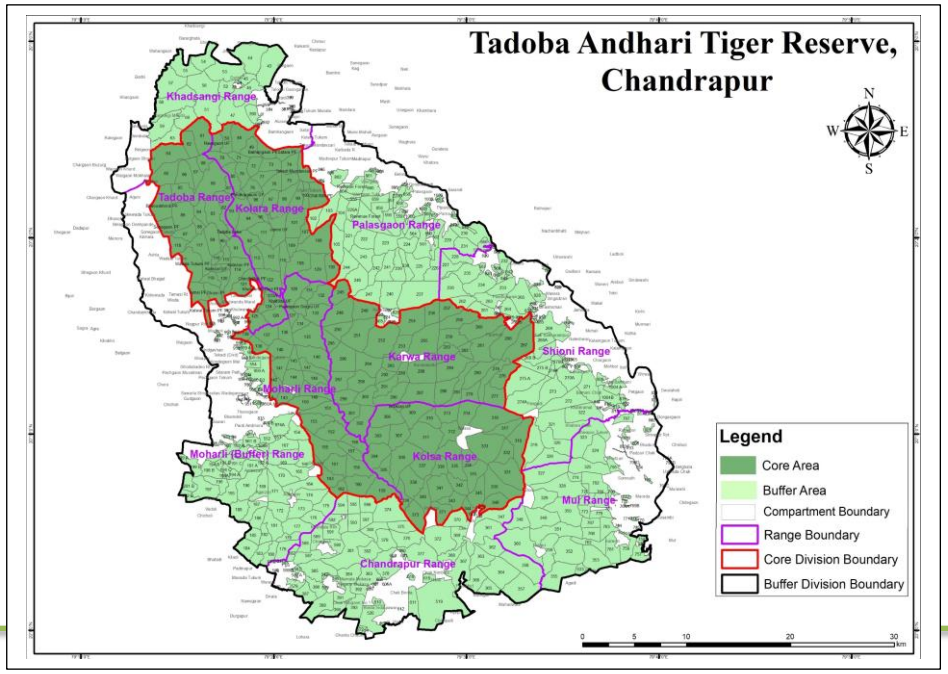
Table-1 showing name of grassland in Tadoba and their respective areas

Sr. No.	Name of grassland	Area in Hectares
	Kolara Range grasslands	
1	**Navegaon part 1 (Rehabilated Site)**	235 Hectare
2	Kosekanar	10 Hectare
3	Pandharpauni	30 Hectare
4	Jamni **(Rehabilated Site)**	47 Hectare
5	Samadhi	08 Hectare
6	Rampur	12 Hactre
7	Saradh	10 Hectare
	Tadoba Range Grasslands	
1	Navegaon part 2	40 Hectare
2	Tadoba beat Comp. No. 90	33 Hectare
3	Khatoda	10 Hectare
	Mohrli Range Grasslands	
1	Palasgaon (**Rehabilated Site**)	95 Hectare
2	Girghat	58 Hectare
3	Astkoni Com. No. 146	20 Hectare
	Karwa Range	
1	Sukdobodi	10 Hectare
	Rantalodi rehabilitated Village	41.39 Hectare
	Kolsa Range Grasslands	
1	Botezari	41 Hectare
2	Kohapari	11 Hectare
	Doni	65 Hectare
	Kolsa (**Rehabilitated village**)	150 Hectare

Tadoba Andhari Tiger reserve map showing core and buffer area



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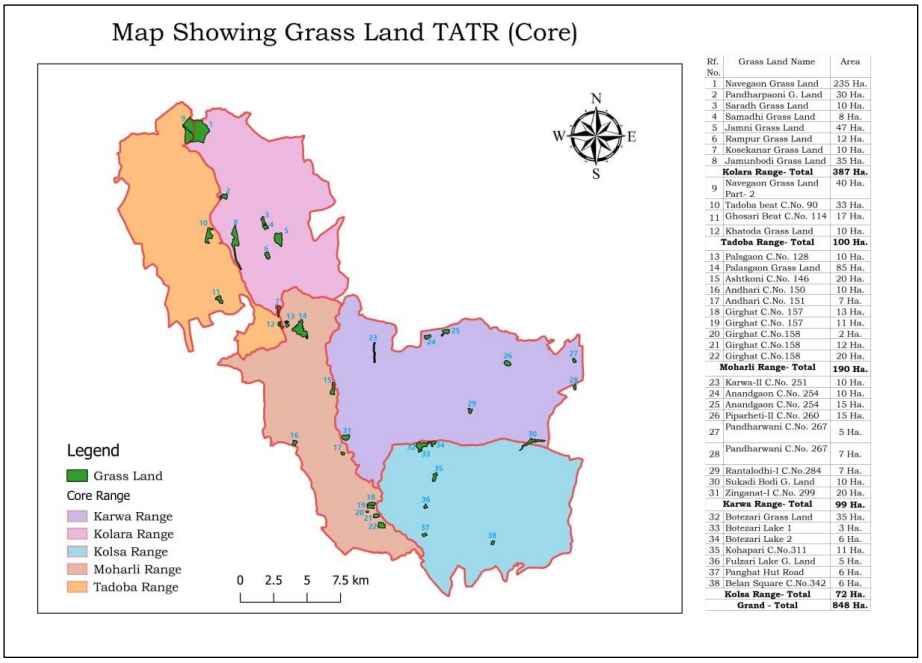

Rf. No.	Grass Land Name	Area
1	Navegaon Grass Land	235 Ha.
2	Pandharpaoni G. Land	30 Ha.
3	Saradh Grass Land	10 Ha.
4	Samadhi Grass Land	8 Ha.
5	Jamni Grass Land	47 Ha.
6	Rampur Grass Land	12 Ha.
7	Kosekanar Grass Land	10 Ha.
8	Jamunbodi Grass Land	35 Ha.
	Kolara Range- Total	**387 Ha.**
9	Navegaon Grass Land Part- 2	40 Ha.
10	Tadoba beat C.No. 90	33 Ha.
11	Ghosari Beat C.No. 114	17 Ha.
12	Khatoda Grass Land	10 Ha.
	Tadoba Range- Total	**100 Ha.**
13	Palsgaon C.No. 128	10 Ha.
14	Palasgaon Grass Land	85 Ha.
15	Ashtkoni C.No. 146	20 Ha.
16	Andhari C.No. 150	10 Ha.
17	Andhari C.No. 151	7 Ha.
18	Girghat C.No. 157	13 Ha.
19	Girghat C.No. 157	11 Ha.
20	Girghat C.No.158	2 Ha.
21	Girghat C.No.158	12 Ha.
22	Girghat C.No.158	20 Ha.
	Moharli Range- Total	**190 Ha.**
23	Karwa-II C.No. 251	10 Ha.
24	Anandgaon C.No. 254	10 Ha.
25	Anandgaon C.No. 254	15 Ha.
26	Piparheti-II C.No. 260	15 Ha.
27	Pandharwani C.No. 267	5 Ha.
28	Pandharwani C.No. 267	7 Ha.
29	Rantalodhi-I C.No.284	7 Ha.
30	Sukadi Bodi G. Land	10 Ha.
31	Zingsnat-I C.No. 299	20 Ha.
	Karwa Range- Total	**99 Ha.**
32	Botezari Grass Land	35 Ha.
33	Botezari Lake 1	3 Ha.
34	Botezari Lake 2	6 Ha.
35	Kohapari C.No.311	11 Ha.
36	Fulzari Lake G. Land	5 Ha.
37	Panghat Hut Road	6 Ha.
38	Belan Square C.No.342	6 Ha.
	Kolsa Range- Total	**72 Ha.**
	Grand - Total	**848 Ha.**

Table-2 Showing The phenological data with reference to Annual, perennial, Flowering, fruiting and reproduction id illustrated

Sr. No.	Botanical name	Local name	Annual /Perennial A/P	Flowering season	fruiting season	Seeds germination period	Leaf primordia formation
01	*Acrachne recemosa*		Annual	August	Oct	July	July -August
02	*Andropogon pumilus*		Annual	Sept	Nov	July	July
03	*Apluda mutica*	Moti tura	Annual	Sept	Nov	July	July -Aug
04	*Aristida funiculata*	Zadu	Annual	Aug-Dec	Oct	Dec	July
05	*Anthraxon lancifolius*		Annual	Oct	Dec	July	July
06	*Bothrichloa bladhi*	Vaidya	Perennial	Nov	Dec	Aug	Aug
07	*Brachiaria ramosa*	Sama , sawa	Annual	Sep	Dec	July	July
08	*Brachiaria repans*	Sawa	Annual	Aug-Jan	Dec	July	July
09	*Brachiaria eruciformis*	Sawa	Annual	Aug-Dec	Dec	July	July
10	*Bothriochloa tuberosa*	Vaidya	Perennial	Nov	Dec	July	Aug
11	*Chloris virgata*	Gondali	Perennial	Aug-Jan	Dec	July	July
12	*Chloris dolichostachya*	Sikka	Perennial	Oct	Dec	July	July
13	*Chloris gyana*	Lahan sika	Perennial	Nov	Jan	July	July
14	*Coix lacryma jobi*	Ran jondhali	Perennial	Nov	Dec –Jan	Sept	Sept
15	*Cymbopogon martinae*	Tikhadi	Perennial	Sept	Dec	July	July
16	*Cynadon dactylon*	Durwa	Perennial	Oct	--	---	rhizome/runner
17	*Dactyloctenium aegypticum*	Crow foot	Annual	Nov	Dec	July	July
18	*Dendracalamus strictus*	Bamboo	Perennial	Dec	March – April	Aug	Aug
19	*Dicanthium annulatum*	Marvel	Perennial	Oct to Feb	---	July	vegetative propagation
20	*Dicanthium caricosum*	Marvel.	Perennial	Oct to Feb	---	July	vegetative propagation
21	*Digitaria stricta*	Ravi	Annual	Sept	Nov	July	July
22	*Dimeria ornithopodai*	Harin shingi	Annual	Oct	Nov.	July	July
23	*Oplismenus compositus*	Futana	Annual	Nov	Dec.	July	

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24	*Panicum exacum*	-----	Annual	Oct.	Nov.	July	
25	*Eleusine indica*	Jangli nachni	Annual	Oct	Nov. –Dec.	July	July
26	*Eragrostiella biferia*		Annual	Oct	Dec	July	July
27	*Eragrostiella coromondeliana*		Annual	Sept	Oct	July	July
28	*Eragrostris major*	Ran Poha	Annual	Sept	Oct	July	July
29	*Eragrostris tenella*		Annual	Sept	Oct	July	July
30	*Eragrostris tenuifolia*		Annual	Sept	Oct	July	July
31	*Eragrostris unioloides*	Ran poha	Annual	Sept	Oct	July	July
32	*Eragrostris viscosa*		Annual	Sept	Oct	June	July
33	*Heteropogon contorpus*	Kusal	Perennial	Oct	Dec	July	July
34	*Imperata cylindrica*	Dhab	Perennial	Jan	Feb	July	July
35	*Ischaemum pilosun*	Kunda	Perennial	Nov	Dec –Jan	July	July
36	*Ischaemum rugosum*	Ber	Perennial	Oct	Nov -Dec	July	July
37	*Iseilema laxum*	Moshan	Perennial	Oct	Dec	July	July
38	*Iselima prostratum*	Moshan	Perennial	Oct	Dec	July	July
39	*Oplismenus burmannii*	Futana	Annual	Oct	Nov	July	July
40	*Oriyza rufipogon*	Wild dhan	Annual	Oct	Dec	July	July
41	*Panicum antilotale*		Annual	Oct	Nov	July	July
42	*Panicum psilopodium*	Kutki	Annual	Oct	Nov	July	July
43	*Panicum sumatrense*	Kutki	Annual	Oct	Nov	July	July
44	*Paspalidium flavidium*	Bodila	Annual	Oct	Nov	July	July
45	*Paspalum canare*	Kodo	Annual	Oct	Dec	July	July
46	*Paspalum paspalodes*	Kodo	Annual	Oct	Dec	July	July
47	*Pennisetum pedicellatum*	Deenanath	Annual	Oct	Dec	July	July
48	*Rottbolia cochinchinensis*		Annual	Oct	Dec	July	July
49	*Saccharum spontaneum*	Padyal	Perennial	Oct	Dec.	June	June – July
50	*Sacciolepis indica*		Annual	Nov	Dec.	July	July
51	*Sehima nervosum*	Pawanya	Perennial	Oct	Nov.	July	July
52	*Setaria intermedia*	Ran bajra	Annual	Sept	Nov.	June	July
53	*Setaria italica*	Bhagar	Annual	Sept	Nov.	June	July
54	*Setaria pumilla*	ran bajra	Annual	Sept	Nov.	June	July
55	*Setaria verticillata*	Chikta	Annual	Sept	Nov.	June	July
56	*Sorghum haplense*	Barwad	Annual	Oct	Dec.	July	July
57	*Sporobolus coromandelianus*	Bhubhusi	Annual	Aug	Oct	June	July
58	*Sporobolus indicus*	Bhurbhusi	Annual	Aug	Oct	June	July
59	*Themeda quadrivalvis*	Gonyad	Annual	Oct.	Dec	July	July
60	*Tripogon jacquemontii*	Tifati	Annual	Oct.	**Nov.**	**July**	**July**
61	*Vitivera zizanoides*	Khus	Perennial	Nov.	Jan	July – Aug.	Aug.

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