

Role of wild leguminous plants in grasslands management in forest ecosystem of Protected Areas of Madhya Pradesh State

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ABSTRACT

Grasslands in melghat forest are of annual , taller type with coarse grasses. The dominant grasses are *Themeda quadrivalvis* , *Heteropogon contortus* , *Apluda mutica* , *Chloris barbata* . The soil is murmi red with low water holding capacity , in some parts the soil diversity observed black , red soil with clay , silt , sand and loam. The grasses are annual and very few are perennials like *Dicanthium annulatum* , *Dicanthium caricosum* , *Cynodon barberi* , *Bothrichloa bladhii* . The palatability of th grasses depends upon the soil nutrients , chemicals. The soil in which the wild leguminous plants like *Vigna trilobata* , *Phaseolus radiate* , *Glycine max* , *Rhynchosia minima* shows the more distribution of wild leguminous plants the soil is with more nitrogenous content due to biological nitrogen fixation and the soil shows the effects on fodder value of the grasses.

Keywords : Grasslands Protected Areas , palatable grasses , soil fertility , Wild leguminous plants

Introduction

Madhya Pradesh is one of those promising states in India. Whether it's Bandhavgarh or Kanha or Pench, each and every national park is far from the civilization and has a rustic charm of its own. Remarkable flora and fauna of these nine National Parks is matched by scenic landscapes along with the incredible diversity. Who can forget the famous classic novel, the jungle book? Yes, the adventures of the little boy, Mowgli with Sher Khan and Bagheera. The inspiration that lead Rudyard Kipling write Jungle Book was the charm of the Kanha and Pench National Park. Bandhavgarh National Park in Madhya Pradesh has the highest density of tiger population in India.

Grasses in Madhya Pradesh State forest shows the more diversity in their distribution , growth form , phenology due to the topography of the region. The succession trends are observed in the grasses of M. P. forest. According to Agrawal et al. (1961) *Arundenella* spp. Form a higher stage in succession. In the protected areas the species like *Chrysopogon* and *Tripogon* dominates the other grass species. After the well establishment and the good growth form the grasses like *Themeda* , *Heteropogon* , *Ischaemum* , *Apluda* also appear in more forms.

During the present investigation, intensive and extensive survey was undertaken to collect and to study in detail the grasses from Forest of Madhya Pradesh . The investigation aimed at studying morphology and morphological adaptations, geographical distribution, seed germination and and caryopses morphology of grasses. The dominant grass species in the order of their dominance are *Heteropogon contortus* , *Chrysopogon fulvus*, *Themeda quadrivalvis* , *Themeda triandra* T. *laxa* , *Apluda mutica* and other common members of the family includes species like *Cymbopogon martineae* , *Eragrostis unioides*, *Setaria intermedia* , *Sporobolus diander*.

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. The species like *Arthraxon lancifolius* , *Arundenella pumila*, *Sporobolus coromondeliana* , *Digitaria abludens*, are the chief components of farmers category. On the contrary the species like *Heteropogon contortus*, *Andropogon pumulus*, *Chrysopogon fulvus*, *Dicanthium caricosum* , *Setaria intermedia* , which form the autumn vegetation are either perennial vegetation forming large tufts.

The main objectives of the grassland development and management in the protected area of Madhya Pradesh is to know the current ecological status of grasses, enlist the grasses, identification, herbarium preparation, morpho taxonomical study of grasses, types of grasslands, types of grasses annual, perennial, palatable and non palatable, phyto sociological study of grasses, associates of the grasses, role of wild leguminous plants in grasslands, invasive species identification, effects of invasive species, flowering and fruiting season of grasses, role of browsing plants in grasslands, significance of wild fruit trees in grassland development and management. Preparation of grasses seed banks in each relocated sites of the tiger reserve.

Objectives

- Identification and Enumeration of Wild Relatives of Leguminous plants.
- To identify the wild leguminous plants from open grasslands with the help of morphological study by using regional floras.
- Exploration of plants from forest areas.
- To determine diversity of wild leguminous plants and its ecological significance in forest ecosystem.
- Floral association in grassland ecosystem and its role in soil fertility, symbiosis.
- Enumeration and documentation of leguminous plants with reference to GPS co-ordinates, lat-long of the plants.
- Phonological study of the leguminous plants.

Methodology

Grasslands in M.P. forest are observed and studied with reference to ecological aspect – soil texture, colour, Ph, temperature. The grasslands composition studied in rainy and winter season by morphological study and taxonomical study. The weed species are also identified which shows the negative impact on growth of grasses. The wild leguminous plants are identified which belongs to Leguminosae (Fabaceae), the wild leguminous plants are identified with the help of presence of nodulated roots underground, the root nodules play important role in biological nitrogen fixation with the help of nitrogen fixing bacteria. The texture, composition of the soil studied and compared with leguminous plants and without leguminous plants. The main five grasses are selected for study- Themeda quadrivalvis, Heteropogon contortus, Dicanthium annulatum, Chloris barbata and Digitaria adlundens. The association of these grasses with leguminous plants studies. The phytochemistry of the selected grasses observed and studied with reference to distribution of Ash, Protein, Fiber, Water and organic content with the standard chemical analysis method with the help of spectrophotometer, flame photometer, Kjeldahl's assembly.

The phytochemical data grasses with leguminous plants and grasses without leguminous plants are studied and compared.

Sr. No	Study site	Coordinates
1	Pench Tiger Reserve	21° 41' 35" N, 79° 14' 54" E
2	Satpura Tiger Reserve	22°29'42"N 78°13'52"E
3	Bandhavgarh National Park	23°41'58"N 80°57'43"E
4	Kanha Tiger Reserve	22°20'N 80°38'E
5	The Sanjay National Park	23°53'7"N 82°3'19"E

6	Panna National Park	24°43'49.6"N 80°0'38.8"E
7	Van Vihar National Park	23°13'48"N 77°21'59"E
8	Kuno Wildlife Sanctuary	25°30'00"N 77°26'00"E
9	Nauradehi Wildlife Sanctuary	23°10'41.31"N 79°12'6.79"E 23°10'41.31"N 79°12'6.79"E

Observations

The grasslands of Madhya Pradesh forest are dominated by three important grasses like *Themeda quadrivalvis*, *Heteropogon contortus* and *Digitaria ablutens*, other grasses observed are *Bothriochloa intermedia*, *Bothriochloa pertusa*, *Brachiaria brizantha*, *Chloris gayana*, *Chrysopogon fulvus*, *Cymbopogon citratus*, *Dichanthium annulatum*, *Heteropogon contortus*, *Iscilema laxum*, *Panicum antidotale*, *Panicum maximum*, *Paspalum notatum*, *Setaria pumilla*. The grasses are annual as well as perennial, palatable and non palatable. The wild leguminous plants observed are *Atylosia scarabaeoides*, *Centrosema pubescens*, *Clitoria ternatea*, *Desmodium tortuosum*, *Dolichos biflorus*, *Glycine max*, *Indigofera tinctoria*, *Lablab purpureus*, *Phaseolus radiata*, *Rhynchosia minima*, *Sesbania aegyptica*, *Stylosanthes hamata*, *Vigna trilobata*, *Vigna sublobata*.

Sr. No.	Locality	GPS Coordinates	Wild legume species	Remarks
1	Pench Tiger Reserve	21° 41' 35" N, 79° 14' 54" E	<i>Atylosia scarabaeoides</i>	Herbaceous climber with 4 seeded pods, leaves trifoliolate, hairy, roots nodulated, shows association with <i>Themeda quadrivalvis</i> , <i>Heteropogon contortus</i> , <i>Chloris barbata</i> grasses
		21° 41' 29" N, 79° 14' 36" E	<i>Cajanus scarabaeoides</i>	Herbaceous small climber with 2-4 seeded pods, leaves trifoliolate, roots nodulated, shows association with <i>Themeda quadrivalvis</i> , <i>Heteropogon contortus</i> , grasses
2	Satpura Tiger Reserve	22°35'09.9"N 78°23'59"E Mogra East Pachmarhi	<i>Ureria picta</i> (Banghewada)	Rare wild legume in Madhya Pradesh forest. Shows association with smaller and taller grasses.
		22°35'27.3"N 78°20'80.6"E Raikheda	Wild legumes <i>Atylosia scarabaeoides</i> , <i>Phaseolus vulgaris</i> , <i>Rhynchosia minima</i> , <i>Rhynchosia maxima</i>	Wild legumes present in open grasslands, associated with <i>Heteropogon</i> , <i>Digitaria</i> , <i>Themeda</i> , <i>Dichanthium</i>
		22°35'18.7"N 78°24'56.5"E Mogra East Pachmarhi	<i>Rhynchosia minima</i> , <i>Atylosia scarabaeoides</i> , <i>Vigna trifolia</i> <i>Vigna unguolata</i>	Germ plasm plot of STR in which all legumes are present. Generic diversity plot of wild