

GRASS SPECIES OF BHADRA WILDLIFE SANCTUARY IN KARNATAKA, INDIA

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Abstract: Bhadra Wildlife Sanctuary is situated in the Western Ghats region of Karnataka and it is a home for diverse flora and fauna. The Sanctuary represents dry deciduous, moist deciduous and evergreen type of vegetation. Present study was under taken (2004–2006) to survey, identify, and document and to know the economic importance of grass species in four ranges of the Sanctuary. Results of the present study indicated that 67 grass species belonging to 48 genera and 9 tribes are growing in the Sanctuary and 36 species are known for their fodder and forage values. Lakkavalli range harboured 50 grass species followed by Tanigebylu and Hebbe (39 each). Many grass species have not been documented in the literature. This is the first report on the grass species of the Sanctuary.

INTRODUCTION

The Western Ghats tract, running parallel to the West Coast of India, is identified as one of the 34 biodiversity hotspots of the world (Mittermeier *et al.*, 2005) and regarded as the most significant repository of India's biodiversity (Gadgil and Meher-Homji, 1990). Bhadra Wildlife Sanctuary is located in the midst of the Western Ghats region of Karnataka and extends over an area of 492.46 km². The Sanctuary is the biological treasure trove for a variety of plant and animal species.

Flora of the Sanctuary comprise of more than 102 species of trees and 79 species of herbs excluding grasses (Anon., 2000). The grass family is one of the largest families of flowering plants and occupy the fourth place in the world, comprising of 9000 species under 651 genera (Clayton *et al.*, 1994). Grasses are a record to no other plant group in their importance to man and his domestic animals, in the form of staple food for millions of people and fodder for livestock worldwide. Some of them are valued for their medicinal importance, and are raw materials for paper pulp, building and thatching materials and aromatic oils. Besides the above, grasses play a great role in soil conservation and Wildlife management.

Most literature highlight the documentation of diversity of dicotyledonous plants and their taxonomic status in the Western Ghats as compared to some work on monocotyledonous plants.

Identification of grasses has been the subject of neglect by researchers since their flowers are inconspicuous and borne on minute spikelets and often are look-alikes, morphologically. Bhadra Wildlife Sanctuary has three major vegetation types - moist and dry deciduous and shola-like vegetation and grasses predominantly grow in the latter two types of vegetation. Literature on grasses of the Sanctuary is limited to their documentation to some extent in the flora (Yoganarasimhan *et al.*, 1982; Ramaswamy *et al.*, 2001). There are no reports on the complete documentation of grass species growing in the Sanctuary area of the Western Ghats. Hence, the present study was under taken to identify and document grasses growing in Bhadra Wildlife Sanctuary as well as to highlight their economic importance.

STUDY SITE

Bhadra Wildlife Sanctuary is spread over Chikmagalur and Shimoga districts of Karnataka. The Sanctuary is surrounded by lofty hill ranges of Mullianagiri and Gangehiri and is known for the picturesque Bhadra river and its water spread. The Sanctuary is situated between 75° 15' and 75° 50' E longitude, and 13° 26' and 13° 50' Northern latitude. The climate of the Sanctuary is warm and humid. There are three distinct seasons - rainy, winter and summer - in the Sanctuary. The temperature ranges from 10°C during winter to above 30°C in summer and

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receives rainfall of about 1200-2600 mm per annum. Moderate temperature and fairly good rainfall nurtures the luxuriant growth of the vegetation. State Forest department of Karnataka has divided the Sanctuary into four ranges – Lakkavalli, Tanigebylu, Muthodi, and Hebbe. These four ranges are again divided into 17 state forest regions of which, 13 state forests -Aldhara, Kakanahosudi, Thammadihalli, Singanamane, Lakkavalli, Kemmannugundi, Muthodi, Kagemanegiri, Hebbegiri, Gangegiri, Madla, Madhuguni, and Bababudangiri were selected for the present work.

Being wind pollinated, grass species can inhabit any kind of forest types. However, grasses are generally scant in the forest, but are found as part of forest undergrowth (Bhat and Nagendran, 2001). Following exploitation of forest area by humans, heavy grazing, logging, and forest fire, the ravaged ecosystem takes a lot of time to repair and regenerate itself, leading to the thinning of forests. The ultimate result is fall in rainfall and under these circumstances, grasses are found in abundance (Patunkur, 1980).

The present work indicated that a total of 67 species of grasses of 48 genera, 9 tribes and 6 subfamilies grow in the Sanctuary. Out of nine tribes identified, the largest tribe Paniceae, consisted of 24 species of 15 genera, followed by Andropogoneae 16 species of 14 genera and Eragrosteae 12 species of 8 genera. The number of species under other tribes are less in number. The systematic treatment of grasses of the Sanctuary is detailed in Table-1.

Bhadra Wildlife Sanctuary, also known as 'valley of bamboos', harbours at least five species of bamboo. Big bamboo (*Bambusa arundinacea*) is abundant in the reserve, all along the streams as has been reported earlier (Anon., 2002). Among four ranges of the Sanctuary, Lakkavalli range with an area of 215.22 km² has been found to be the heaven for 50 grass species followed by Tanigebylu (77.764km²) and Hebbe (93.00 km²) range each supporting 39 grass species, while Muthodi has 37 species (Table-2). Among them, occurrence of *Arundinella pumila*, *A. purpurea*, *A. mesophylla*, *Jansenella griffithiana* and *Paspalum canarae* are limited to Bababudan hills and Kemmannugundi state forests (Tanigebylu range) while, the latter was also found in Muthodi state forest. Among the above,

A. pumila, *A. purpurea*, *A. mesophylla*, *J. griffithiana* and *P. canarae* were reported to be endemic to Kemmannugundi and Bababudan hills (Hooker, 1896). However, recent reports pointed out that *A. pumila* is documented from Nallamalai of Andhra Pradesh (Reddy *et al.*, 2008), while the others (except *P. canarae*) are documented from Anaimalai conservation area of Tamil Nadu (Sanjeev *et al.*, 2002). *Paspalum canarae* is also reported from Tamil Nadu, Kerala, Karnataka, Madhya Pradesh and Maharashtra (www.google.com). In addition to the above ranges, hill tops of Bababudan and Kemmannugundi support luxuriant growth of grasslands which act as feeding ground to Indian bisons and deer population as well as other herbivores. The grass species in these ranges seems to be palatable to these animals (Raju and Hegde, 1995). Abundant grass species have always associated with moist and dry deciduous type of forests and also to some extent in evergreen forests with open canopy where the forest floor receives sufficient sunlight (Sringswara, 2006). Lakkavalli, Hebbe and Tanigebylu supported dry deciduous, moist deciduous and evergreen type of forests, respectively. Grasses like *Bambusa arundinacea*, *Dactyloctenium aegyptium*, *Paspalidium flavidum*, *Themeda triandra*, and *Urochloa panicoides* are known for their food value and have been used at times of food scarcity (Anon., 1986; Srivastava, 2002).

Among 67 species of grasses in the Sanctuary, 36 have been known for fodder and forage purposes (Anon., 1986). Major fodder and forage yielding grasses are found in the sub family Panicoideae comprising of 28 species and the remaining seven and one from sub families Eragrostoideae and Centothecoideae, respectively. In addition to the above, a few of them (*Bambusa arundinacea*, *Dendrocalamus strictus*, *Ochlandra scriptoria* and *Heteropogon contortus*) are used in paper pulp and rayon industry. Some of the grass species like, *T. triandra* have medicinal importance; the awns paste is used as an antiseptic agent in ethno-medicine (Pal and Jain, 1989), and the rhizome of *Cynodon dactylon* is used to treat genito-urinary problems (Anon., 1986). Table-3 gives an account of the economic importance of certain grasses growing in the Sanctuary.

Table -1: List of grass species growing in different state forest regions of Bhadra Wildlife Sanctuary

Sub family	Tribe	Species
Bambusoideae	Bambuseae	<i>Bambusa arundinacea</i> Willd. <i>Dendrocalamus strictus</i> (Roxb.) Nees <i>Ochlandra scriptoria</i> (Dennst.) Fischer. <i>Oxytenanthera ritcheyi</i> (Munro) Blatter & McCann. <i>O. stocksii</i> Munro.
Oryzoideae	Oryzeae	<i>Oryza meyeriana</i> Baill.
Centothecoideae	Centothecae	<i>Centotheca lappacea</i> (L.) Desv.
Eragrostoideae	Eragrosteae	<i>Chloris barbata</i> Sw. <i>Cynodon dactylon</i> (L.) Pers. <i>Dactyloctenium aegyptium</i> (L.) P. Beauv. <i>Dinebra retroflexa</i> (Vahl.) Panz. <i>Eleusine indica</i> (L.) Gaertn. <i>Eragrostis gangetica</i> (Roxb.) Steud. <i>E. riparia</i> (Willd.) Nees. <i>E. tenella</i> (L.) Beauv. ex Roem. & Schult. <i>E. tenuifolia</i> (A. Rich.) Hochst. <i>E. unioloides</i> (Retz.) Nees ex Steud. <i>Lepturus radicans</i> Steud. <i>Tripogon bromoides</i> Roem. et Schult.
Eragrostoideae	Sporoboleae	<i>Sporobolus indicus</i> (L.) R. Br. var. <i>flaccidus</i> (Roem. & Schult.) Veldk. <i>S. tenuissimus</i> (Schrank) O. Kuntze
	Aristideae	<i>Aristida setacea</i> Retz. <i>Polypogon monspeliensis</i> (L.) Desf.
Panicoideae	Arundinelleae	<i>Arundinella pumila</i> (Hochst. ex A Rich.) Steud. <i>A. purpurea</i> Hochst. ex Steud. <i>A. mesophylla</i> Nees ex Steud. <i>Jansenella griffithiana</i> (C. Muell.) Bor
	Paniceae	<i>Alloteropsis cimicina</i> (L.) Stapf. <i>Axonopus compressus</i> (Swartz) P. Beauv. <i>Brachiaria ramosa</i> (L.) Stapf. <i>B. eruciformis</i> (J. E. Sm.) Griseb. <i>Cyrtococcum oxyphyllum</i> (Steud.) Stapf. <i>C. patens</i> A. Camus <i>Digitaria bicornis</i> (Lam) Roem. & Schult.. <i>Echinochloa colona</i> Link. <i>Eriochloa procera</i> (Retz.) C.E. Hubb. <i>Oplismenus compositus</i> (L.) P. Beauv. <i>O. burmannii</i> (Retz.) P. Beauv. <i>Panicum psilopodium</i> Trin. <i>P. trypheron</i> Schult. <i>Paspalidium flavidum</i> (Retz.) A. Camus. <i>Paspalum canarae</i> (Steud.) Veldk. <i>P. conjugatum</i> Berg. <i>P. scorbiculatum</i> L. <i>P. paspalodes</i> (Michx.) Scribn. <i>Pennisetum pedicellatum</i> Trin. <i>Rhynchelytrum villosum</i> (Parl.) Chiov. <i>Setaria intermedia</i> Roem. & Schult. <i>S. homonyma</i> (Steud.) Chiov. <i>S. pumila</i> (Poir.) Roem. & Schult. <i>Urochloa panicoides</i> P. Beauv.

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	Andropogoneae	<i>Arthraxon hispidus</i> (Thumb.) Makino <i>Apluda mutica</i> L. <i>Bothriochloa pertusa</i> (Willd.) A. Camus <i>Capillipedium huegelii</i> (Hack.) Stapf. <i>Chrysopogon aciculatus</i> (Retz.) Trin. <i>C. fulvus</i> (Spr.) Chiov. <i>Dichanthium caricosum</i> (L.) A. Camus <i>Dimeria ornithopoda</i> Trin. <i>Hackelochloa granularis</i> Kuntze = <i>Mnesithea granularis</i> (L.) Koning & Sosef. <i>Heteropogon contortus</i> (L.) P. Beauv. <i>Ischaemum ciliare</i> Retz. = <i>Ischaemum indicum</i> (Houtt.) Merrill. <i>Iseilema prostratum</i> (L.) Andersson. <i>Pseudanthistiria umbellata</i> (Hack.) Hook. f. <i>Rottboellia cochinchinensis</i> (Lour.) Clayton = <i>Rottboellia exaltata</i> L. f. <i>Themeda tremula</i> (Nees ex Steud) Hack. <i>T. triandra</i> Forssk.
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Table -2: Distribution of grass species in four forest ranges of the Sanctuary

Sl. No.	Species	Bhadra Wildlife Sanctuary			
		Lakkavalli Range (5 state forests)	Tanigebylu Range (2 state forests)	Muthodi Range (2 state forests)	Hebbe Range (4 state forests)
1	<i>Bambusa arundinacea</i> Willd	5	0	2	4
2	<i>Dendrocalamus strictus</i> (Roxb.) Nees +	3	0	2	4
3	<i>Ochlandra scriptoria</i> (Dennst.) Fischer	2	0	2	4
4	<i>Oxytenanthera ritcheyi</i> (Munro) Blatter & McCann	1	0	2	4
5	<i>O. stocksii</i> Munro	1	0	2	4
6	<i>Oryza meyeriana</i> Baill.	0	1	0	0
7	<i>Centotheca lappacea</i> (L.) Desv.*	0	2	0	0
8	<i>Chloris barbata</i>	5	1	2	4
9	<i>Cynodon dactylon</i>	5	2	2	4
10	<i>Chloris barbata</i> Sw.	5	2	2	4
11	<i>Cynodon dactylon</i> (L.) Pers.	5	0	2	4
12	<i>Dactyloctenium aegyptium</i> (L.) P. Beauv.*	5	2	2	4
13	<i>Dinebra retroflexa</i> (Vahl.) Panz.	4	1	2	2
14	<i>Eleusine indica</i> (L.) Gaertn.*	5	0	2	2
15	<i>Eragrostis gangetica</i> (Roxb.) Steud. +	5	1	0	3
16	<i>E. riparia</i> (Willd.) Nees	5	2	2	4
17	<i>E. tenella</i> (L.) P. Beauv. ex Roem. & Schult.	5	2	2	4
18	<i>E. tenuifolia</i> (A. Rich.) Hochst.	0	0	0	2
19	<i>E. unioloides</i> (Retz.) Nees ex Steud. + *	0	1	0	0
20	<i>Sporobolus indicus</i> (L.) R. Br. var. <i>flaccidus</i> (Roem. & Schult.) Veldkamp +	5	2	2	4
21	<i>S. tenuissimus</i> (Schrank) O. Kuntze	3	0	0	0
22	<i>Aristida setacea</i> Retz.	5	0	0	0

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23	<i>Polypogon monspeliensis</i> (L.) Desf.	0	2	2	2
24	<i>Arundinella pumila</i> (Hochst. ex A Rich.) Steud. *	0	2	0	0
25	<i>A. purpurea</i> Hochst. ex Steud. +	0	2	0	0
26	<i>A. mesophylla</i> Nees ex Steud.	0	2	0	0
27	<i>Jansenella griffithiana</i> (C. Muell.) Bor + *	0	2	1	0
28	<i>Alloteropsis cimicina</i> (L.) Stapf *	5	2	2	4
29	<i>Axonopus compressus</i> (Swartz) P. Beauv.	5	0	0	0
30	<i>Brachiaria ramosa</i> (L.) Stapf	5	0	0	4
31	<i>B. eruciformis</i> (J. E. Sm.) Griseb.	2	0	0	0
32	<i>Cyrtococcum oxyphyllum</i> (Steud.) Stapf *	0	2	0	1
33	<i>C. patens</i> A. Camus	2	2	2	4
34	<i>Digitaria bicornis</i> (Lam.) Roem. & Schult. *	5	2	2	4
35	<i>Echinochloa colona</i> Link *	5	2	2	4
36	<i>Eriochloa procera</i> (Retz.) C.E. Hubbard	3	0	0	0
37	<i>Oplismenus compositus</i> (L.) P. Beauv. *	4	0	0	0
38	<i>O. burmannii</i> (Retz.) P. Beauv.	2	0	0	0
39	<i>Panicum psilopodium</i> Trin. *	5	1	2	2
40	<i>P. trypheron</i> Schult.	2	0	2	4
41	<i>Paspalidium flavidum</i> (Retz.) A. Camus *	5	2	2	4
42	<i>Paspalum canarae</i> (Steud.) Veldk.	0	2	0	0
43	<i>P. conjugatum</i> Berg.	1	0	0	0
44	<i>P. scorbiculatum</i> L. *	5	0	2	4
45	<i>P. paspalodes</i> (Michx.) Scribn.	5	0	0	0
46	<i>Pennisetum pedicellatum</i> Trin. *	4	1	2	3
47	<i>Rhynchelytrum villosum</i> (Parl.) Chiov.	1	0	0	0
48	<i>Setaria intermedia</i> Roem. & Schult.	5	0	2	0
49	<i>S. homonyma</i> (Steud.) Chiov.	2	0	0	0
50	<i>S. pumila</i> (Poir.) Roem. & Schult.	4	0	2	4
51	<i>Urochloa panicoides</i> P. Beauv.	2	2	1	3
52	<i>Arthraxon hispidus</i> (Thumb.) Makino. *	4	0	1	4
53	<i>Apluda mutica</i> L.	0	2	1	0
54	<i>Bothriochloa pertusa</i> (Willd.) A. Camus.	5	0	0	0
55	<i>Capillipedium huegelii</i> (Hack.) Stapf +	5	2	2	4
56	<i>Chrysopogon aciculatus</i> (Retz.) Trin. *	5	2	2	4
57	<i>C. fulvus</i> (Spr.) Chiov.	2	1	0	0
58	<i>Dichanthium caricosum</i> (L.) A. Camus	4	1	0	2
59	<i>Dimeria ornithopoda</i> Trin.	2	2	2	4
60	<i>Hackelochloa granularis</i> (L.) O. Kuntze = <i>Mnesithea granularis</i> (L.) Koning & Sosef	4	1	2	2
61	<i>Heteropogon contortus</i> (L.) P. Beauv. * +	5	2	2	4

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62	<i>Ischaemum ciliare</i> Retz.= <i>Ischaemum indicum</i> (Houtt.) Merrill. *	5	2	2	4
63	<i>Iseilema prostratum</i> (L.) Andersson	0	1	0	0
64	<i>Pseudanthistiria umbellata</i> (Hack.) Hook. f.	4	0	0	0
65	<i>Rottboellia cochinchinensis</i> (Lour.) W.D. Clayton= <i>Rottboellia exaltata</i> L. f.	3	2	1	2
66	<i>Themeda tremula</i> (Nees ex. steud) Hack.	0	1	0	0
67	<i>T. triandra</i> Forsk. +	5	1	0	0

5, 4, 3, 2, 1 – present in all five, four, three, two or one state forests, respectively

*Mentioned in Shimoga flora (Ramaswamy *et al.*, 2001)

+ Mentioned in Chikmagalur flora (Yoganarasimhan *et al.*, 1982)

Table -3: List of grass species growing in different state forest regions of Bhadra Wildlife Sanctuary having economic importance

Sl. No	Species	Importance		References
		Botanical	Medicinal	
1	<i>Bambusa arundinacea</i> Willd	Constructional work	Anti inflammatory, antiulcer activity, osteoporosis and in strengthening the musculoskeletal system, preventing injuries and healing of fractures, maintaining the integrity of bones, arterial walls, skin, teeth, gums, hair and nails and to alleviate eczema and psoriasis. Expulsion of placenta in cattle and humans.	(http://delta-intkey.com/grass/www/bambusa.html) (Muniappan and Sundararaj, 2003). http://www.bambooya.com/baheme.html) Parinitha <i>et al.</i> , (2004)
2	<i>Dendrocalamus strictus</i> (Roxb.) Nees	Branches for making and thatching huts, ladders, as raw material in paper mills, carts and pipes. Split stems for the weaving of baskets and mats, reclamation of ravine land, and for construction, agricultural implements, musical instruments, furniture etc. Young shoots commonly used as food.	Leaves for treatment of cough and cold in pet animals.	http://www.inbar.int/publication/txt/tr17/Dendrocalamus/strictus.html (Koche <i>et al.</i> , 2008).
3	<i>Ochlandra scriptoria</i> (Dennst.) Fischer	Leaves used for thatching	-	Sukumaran and Raj (2008)
4	<i>Centotheca lappacea</i> (L.) Desv.	Forage	-	http://proseanet.org
5	<i>Cynodon dactylon</i> (L.) Pers.	Roots are used for storage purposes to keep away insects from wheat grains.	Whole plant used to cure fresh cut, injuries, cough and menstrual disorders.	Ahmad <i>et al.</i> (2010) Khumbongmayum <i>et al.</i> (2005) Qureshi <i>et al.</i> (2010)

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			Root decoction given to cattle suffering from respiratory diseases. The fresh leaf paste is applied on cuts and bleeding wounds and piles. 5-10 drops plant juice inhaled to stop bleeding from nose. Plant juice given in fever and diarrhea. Dandruff in humans.	Rajakumar and Shivanna (2008) Shivanna and Rajakumar (2010)
6	<i>Dactyloctenium aegyptium</i> (L.) P. Beauv.	Fodder and forage	Rigose grains are cooked in to a thick porridge eaten during drought, Fresh plant and grains used to treat fever and small pox.	http://proseanet.org ; Khumbongmayum <i>et al.</i> (2005) Bhandari (1974)
7	<i>Eleusine indica</i> (L.) Gaertn.	Forage and soil binder	Vertebrate poisons: mammals	http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?14997
8	<i>Eragrostis tenella</i> (L.) P. Beauv. ex Roem. & Schult.	Lawn/turf		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?Dict%20Gard
9	<i>E. tenuifolia</i> (A. Rich.) Hochst.	Forage		Lazarides and Hince (1993)
10	<i>Aristida setacea</i> Retz.	Broomstick		Murali <i>et al.</i> (1996)
11	<i>Alloteropsis cimicina</i> (L.) Stapf	Fodder		Singh <i>et al.</i> (2008)
12	<i>Axonopus compressus</i> (Swartz) P. Beauv.	Used as permanent pasture, erosion control; lawn/turf		http://www.tropicalforages.info/key/Forages/Media/Html/Axonopus_compressus.html . http://proseanet.org
13	<i>Brachiaria ramosa</i> (L.) Stapf	Food grain		Kimata <i>et al.</i> (1999)
14	<i>Digitaria bicornis</i> (Lam). Roem. & Schult.	Grains toasted, and ground into flour and used to make porridge or fermented to make beer. Widely used as a staple crop in parts of Africa		www.wikipedia.org
15	<i>Echinochloa colona</i> Link	Forage		http://proseanet.org
16	<i>Oplismenus compositus</i> (L.) P. Beauv.		Pregnancy	Palusamy <i>et al.</i> (2007)
17	<i>O. burmannii</i> (Retz.) P. Beauv.	Fodder		Palusamy <i>et al.</i> (2007)

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18	<i>Paspalidium flavidum</i> (Retz.) A. Camus	Forage		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?F%20Pak (24 June 2010)
19	<i>Paspalum conjugatum</i> Berg.	Forage		http://proseanet.org
20	<i>P. scorbiculatum</i> L.	Cereal, fodder, forage		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?Wealth%20India%20RM (24 June 2010) http://proseanet.org
21	<i>Pennisetum pedicellatum</i> Trin.	Fodder		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?Euphytica (24 June 2010)
22	<i>Setaria intermedia</i> Roem. & Schult.	Fodder		Singh <i>et al.</i> (2008)
23	<i>Apluda mutica</i> L.	Fodder		http://www.ethnoleaflets.com/leaflets/zafeer.html
24	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	Erosion control; lawn/turf		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?Econ%20PI%20Aust (24 June 2010); http://proseanet.org
25	<i>C. fulvus</i> (Spr.) Chiov.	Erosion control; fodder		http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?Austrobaileya (24 June 2010)
26	<i>Heteropogon contortus</i> (L.) P. Beauv.		Decoction of inflorescence used as bronchodilator	Patil <i>et al.</i> (2008)
27	<i>Ischaemum ciliare</i> Retz. = <i>Ischaemum indicum</i> (Houtt.) Merrill.	Lawn/turf, forage		http://proseanet.org , http://www.ars-grin.gov/cgi-bin/npgs/html/stdlit.pl?F%20Viti (24 June 2010)
28	<i>T. triandra</i> Forsk.	Ornamental, forage		http://hua.huh.harvard.edu/FNA/ ; http://proseanet.org

Earlier reports pointed out the occurrence of 9 species of grasses in Chikmagalur (Yoganarasimhan *et al.*, 1982) and 19 species in Shimoga districts (Ramaswamy *et al.*, 2001). However, the present study documented 67 species of grasses. The increased occurrence of grass species in our study could be due to the exposure of forest floor following

denudation due to anthropogenic activities or improper documentation in thick forests that existed earlier on.

The present investigation indicated that many grass species in the Sanctuary are useful to mankind, in one or the other way. Hence, there is an urgent need to conserve these grass species by *in situ* or *ex situ*

method or by depositing seeds of these grasses in gene banks, before these genetic resources are lost for ever.

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