

Study to Document Diversity of Grasses in Grasslands in Goa

Final Report

Submitted to

**Deputy Conservator of Forests
Research & Utilization Division
Government of Goa**

Submitted by



ICLEI South Asia

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Objectives

The present study focussed on documenting the grass species present in the grasslands of Goa. The overall objective of the assignment is **to document diversity of grasses in grasslands in Goa**. The research questions are:

- a. What are the grass species that are present in the grasslands in Goa?
- b. Which of the grass species present in the grasslands in Goa are palatable and which are not?
- c. Which of the grass species present in the grasslands in Goa are native and which are not?

Methodology

As part of the project activities, the following have been conducted

- 1) Methodology finalisation: The main study sites were finalised through a joint discussion with the Forest Department of Goa. The sites that will be sampled are Succoro, Pilerne, Sosogad, Collem, Nandran, Verna, Pale, Ram and Ravon Dongor, Surla, Quitol. The sites have been marked on the GIS platform (refer Figure 1). The area was then gridded. Within the gridded areas, quadrats of 1m*1m were laid. Stratified random sampling has been followed while laying the quadrats. The total number of grass species and the number of individuals of each species in each quadrat was recorded. Digital and physical herbarium of all the grass species is being developed. The GPS coordinates of each quadrat has also been recorded.
- 2) Quadrat studies: Quadrat studies to document the grass species were conducted in all the project sites and the data has been collated and analysed. The specimens have been identified with support from Kolhapur University and Botanical Survey of India. For each site, species diversity, Bray Curtis analysis has been carried out. Analysis in terms of palatability and nativity of the grass species has also been carried out for each site.

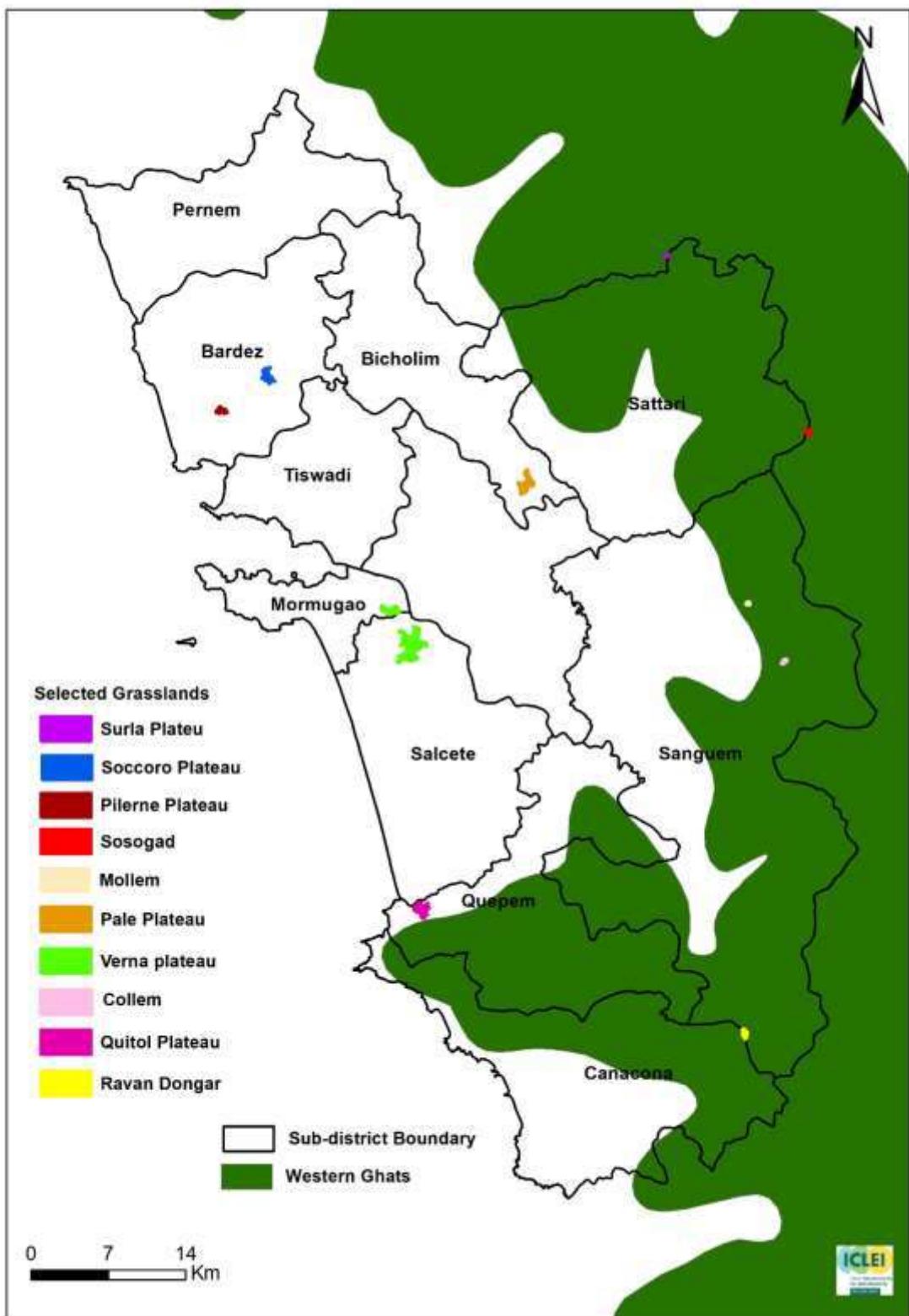


Figure 1: Map depicting the location of the selected grasslands

Results

Objective 1: Grass species present at each site

Through the quadrat studies the herbaceous species present at each site was documented. Table 1 provides an overview of the same.

Table 1: Herbaceous species present at each site

Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Eragrostis unioloides</i>									
<i>Ischaemum semisagittatum</i>									
<i>Ischaemum indicum</i>									
<i>Fimbristylis ferruginea</i>									
<i>Geissaspis cristata</i>									
<i>Neoanotia foetida</i>									
<i>Ischaemum manilaliana</i>									
<i>Fimbristylis schoenoides</i>									
<i>Isachne globosa</i>									
<i>Paspalum conjugatum</i>									
<i>Cyperus rotundus</i>									
<i>Dactyloctenium aegypticum</i>									
<i>Cyperus iria</i>									
<i>Smithia sensitiva</i>									
<i>Alternanthea pungens</i>									
<i>Setaria pallidifusca</i>									
<i>Blumea obliqua</i>									
<i>Rhynchospora wightiana</i>									
<i>Indigofera tinctoria</i>									
<i>Bonnaya antipoda</i>									
<i>Bhidea burniana</i>									
<i>Fimbristylis miliacea</i>									
<i>Ischaemum molle</i>									
<i>Spermacoce ocymoides</i>									
<i>Spermacoce articularis</i>									
<i>Eriocaulon goaense</i>									
<i>Zornia gibbosa</i>									
<i>Ericostema verticellatum</i>									
<i>Chamaecrista mimosoides</i>									
<i>Panicum notatum</i>									
<i>Glyphochloa divergens</i>									
<i>Murdannia edulis</i>									

Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Ramphicarpa fistulosa</i>									
<i>Rotala indica</i>									
<i>Celocia argentea</i>									
<i>Urena lobata</i>									
<i>Rungia apiculata</i>									
<i>Ceropegia attenuata</i>									
<i>Panicum psilopodium</i>									
<i>Impatiens balsamina</i>									
<i>Neanotis subtilis</i>									
<i>Rostellularia procumbens</i>									
<i>Arthraxon lancifolius</i>									
<i>Portulaca grandiflora</i>									
<i>Selaginella kraussiana</i>									
<i>Utricularia malabarica</i>									
<i>Paspalum canare</i>									
<i>Ammannia gracilis</i>									
<i>Apluda mutica</i>									
<i>Lepidagathis fasciculata</i>									
<i>Parasophubia hofmannii</i>									
<i>Exacum pumilum</i>									
<i>Habenaria heyneana</i>									
<i>Dichaschistia trilobata</i>									
<i>Leucas aspera</i>									
<i>Paspalum flavidium</i>									
<i>Arundinella leptochloa</i>									
<i>Eulalia trispicata</i>									
<i>Themeda tremula</i>									
<i>Sopubia delphinifolia</i>									
<i>Polygala erecta</i>									
<i>Jansenella griffithiana</i>									
<i>Arundinella pumila</i>									
<i>Eriocaulon eurypeplon</i>									
<i>Danthonidium gammie</i>									
<i>Eragrostis unioloides</i>									
<i>Eriocaulon stellulatum</i>									
<i>Eriocaulon tuberiferum</i>									
<i>Hedyotis corymbosa</i>									
<i>Ischaemum santapauui</i>									
<i>Kyllinga nemoralis</i>									
<i>Marsilea quadrifida</i>									
<i>Murdannia sp.</i>									

Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Panicum auritum</i>									
<i>Pogostemon deccanensis</i>									
<i>Ramphicarpa longiflora</i>									
<i>Sacciolepis indica</i>									
<i>Utricularia reticulata</i>									
<i>Cajanus cajan</i>									
<i>Dimeria veldkampii</i>									
<i>Heteropogon contortus</i>									
<i>Ischaemum janarthanamii</i>									
<i>Lepidagathis cuspidata</i>									
<i>Salomonia ciliata</i>									
<i>Arundinella metzii</i>									
<i>Arundinella tuberculota</i>									
<i>Canscora shirrangiana</i>									
<i>Cassia pumila</i>									
<i>Chrysopogon aciculatus</i>									
<i>Cyperus squarrosus</i>									
<i>Dimeria woodrowi</i>									
<i>Drosera indica</i>									
<i>Ischaemum sagittatum</i>									
<i>Neoanotis rheedei</i>									
<i>Phyllanthus niruri</i>									
<i>Seasamum indicum</i>									
<i>Ophiurus bombaiensis</i>									
<i>Justicia latifolia</i>									
<i>Alysicarpus naikianus</i>									
<i>Alysicarpus vaginalis</i>									
<i>Atylosia scarabaeoides</i>									
<i>Bonnaya teniifolia</i>									
<i>Cyperus substramineus</i>									
<i>Cyperus tuberosus</i>									
<i>Euphorbia konkanensis</i>									
<i>Geissaspis tenella</i>									
<i>Isachne gracilis</i>									
<i>Lindernia ciliata</i>									
<i>Murdannia semiteres</i>									
<i>Pennisetum pedicellatum</i>									
<i>Smithia conferta</i>									
<i>Tridax procumbens</i>									
<i>Xyris indica</i>									
<i>Cynodon dactylon</i>									

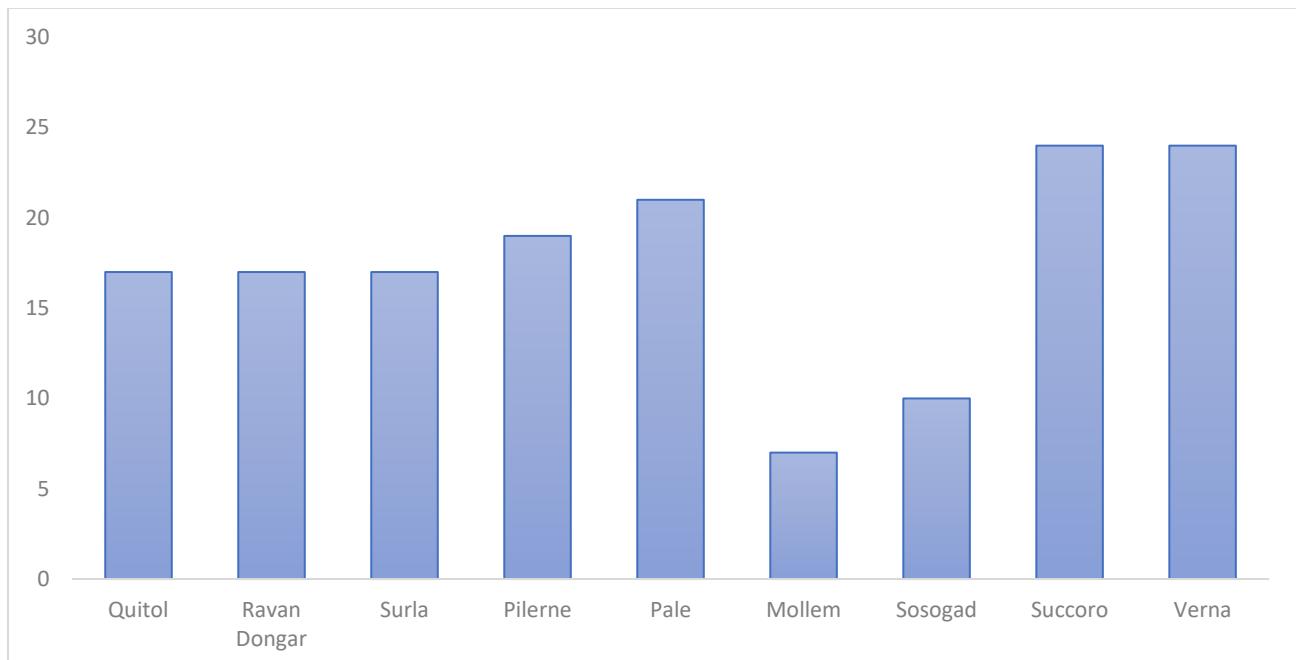
Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Justicia wynaadensis</i>									
<i>Sesamum radiatum</i>									

The grass species recorded from each site is summarised in Table 2.

Table 2: Grass species recorded from each site

Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Eragrostis unioloides</i>									
<i>Ischaemum semisagittatum</i>									
<i>Ischaemum indicum</i>									
<i>Fimbristylis ferruginea</i>									
<i>Ischaemum manilaliana</i>									
<i>Fimbristylis schoenoides</i>									
<i>Isachne globosa</i>									
<i>Paspalum conjugatum</i>									
<i>Cyperus rotundus</i>									
<i>Dactyloctenium aegypticum</i>									
<i>Cyperus iria</i>									
<i>Setaria pallidifusca</i>									
<i>Rhynchospora wightiana</i>									
<i>Fimbristylis miliacea</i>									
<i>Ischaemum molle</i>									
<i>Panicum notatum</i>									
<i>Glypochloa divergens</i>									
<i>Panicum psilopodium</i>									
<i>Arthraxon lancifolius</i>									
<i>Paspalum canare</i>									
<i>Apluda mutica</i>									
<i>Paspalum flavidium</i>									
<i>Arundinella leptochloa</i>									
<i>Eulalia trispicata</i>									
<i>Themeda tremula</i>									
<i>Jansenella griffithiana</i>									
<i>Arundinella pumila</i>									
<i>Danthonidium gammie</i>									
<i>Eragrostis unioloides</i>									
<i>Ischaemum santapauui</i>									
<i>Kyllinga nemoralis</i>									
<i>Panicum auritum</i>									
<i>Sacciolepis indica</i>									

Name of Species	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
<i>Dimeria veldkampii</i>									
<i>Heteropogon contortus</i>									
<i>Ischaemum janarthanamii</i>									
<i>Arundinella metzii</i>									
<i>Arundinella tuberculata</i>									
<i>Chrysopogon aciculatus</i>									
<i>Cyperus squarrosus</i>									
<i>Dimeria woodrowi</i>									
<i>Ischaemum sagittatum</i>									
<i>Ophiurus bombaiensis</i>									
<i>Cyperus substramineus</i>									
<i>Cyperus tuberosus</i>									
<i>Isachne gracilis</i>									
<i>Pennisetum pedicellatum</i>									
<i>Cynodon dactylon</i>									



Quitol

This grassland does not fall under a protected area. A total of 38 species of herbs, belonging to 16 families have been recorded from Quitol (Figure 2). Out of the 38 species, 18 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 3). Out of these 38 species, that have been recorded, 21 fall under the IUCN category of Not Evaluated, 2 fall

under Vulnerable category and 15 are of Least Concern (Figure 4). Annexure 1 provides the complete list of species.

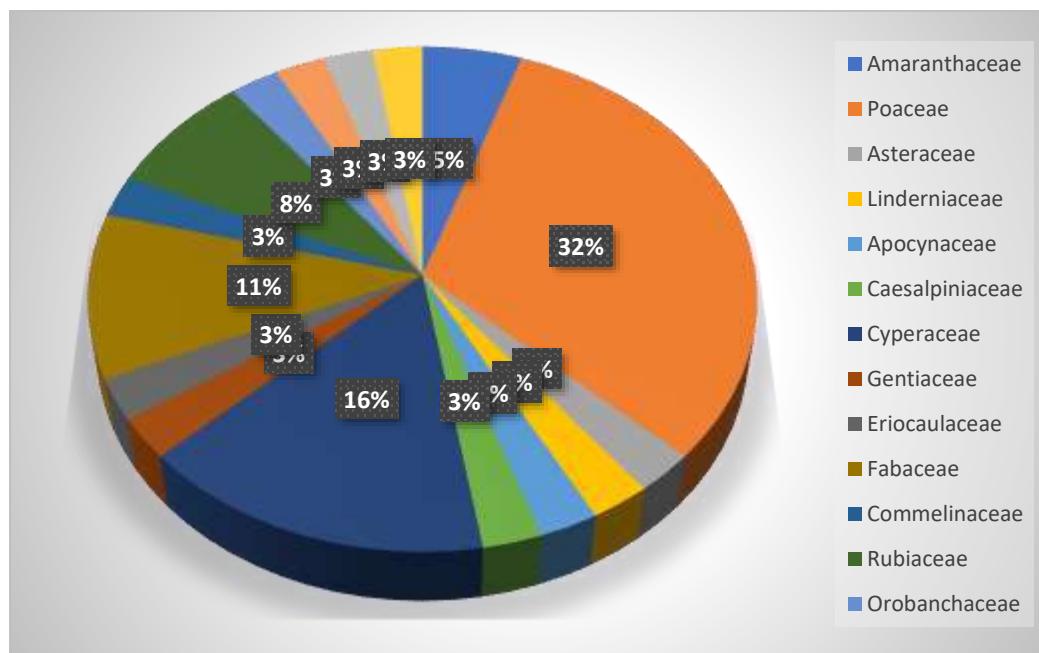


Figure 2: Overview of plant families and representatives recorded from Quito

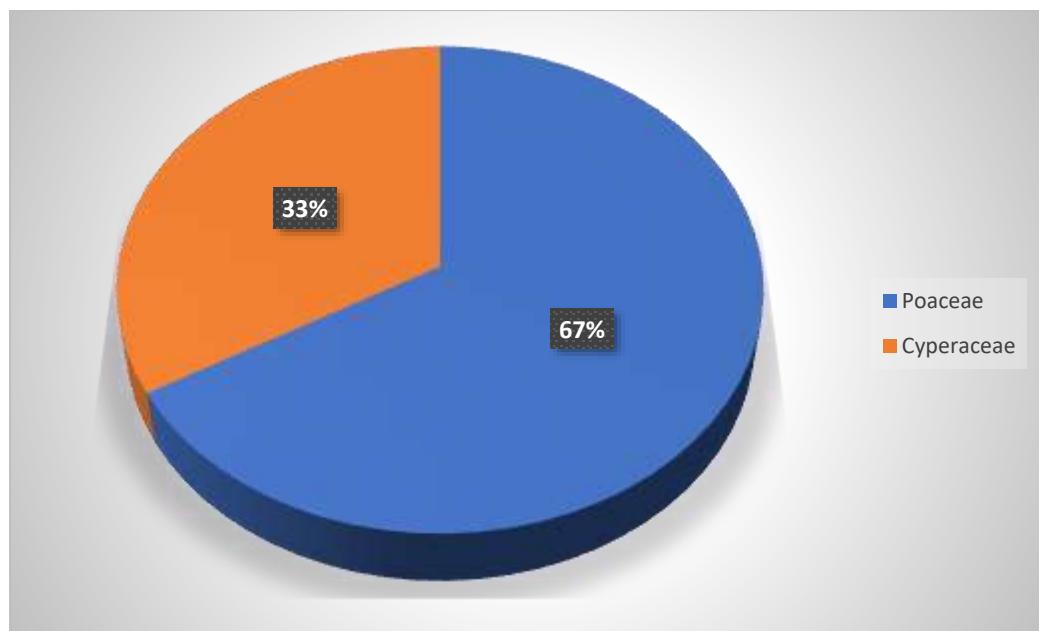


Figure 3: Proportion of representatives of Cyperaceae and Poaceae recorded from Quito

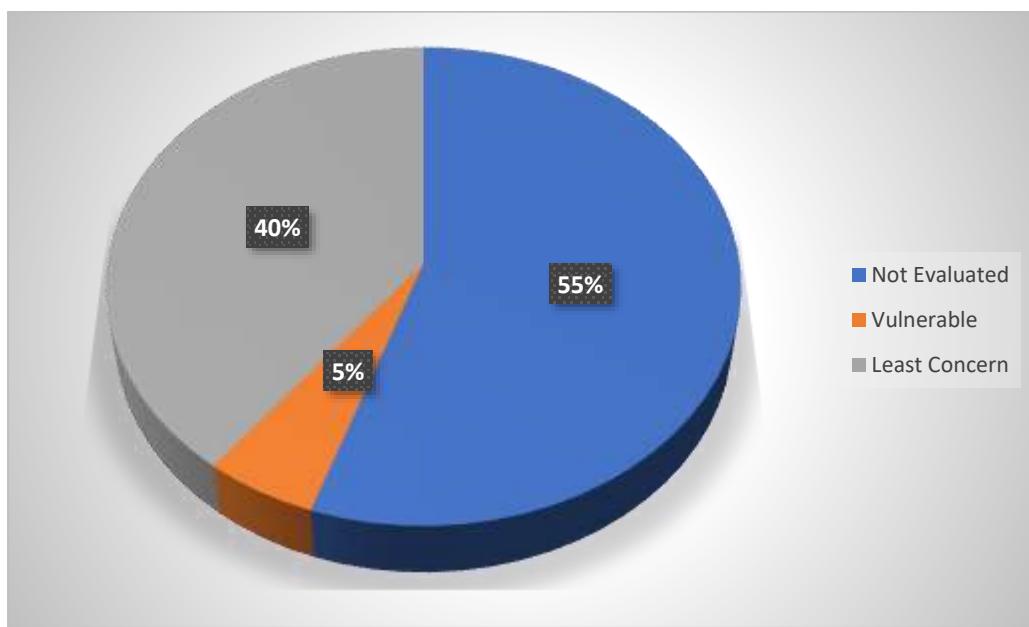


Figure 4: Distribution of herbaceous species recorded from Quitol, based on IUCN classification

Ravan Dongar

This grassland falls under a protected area. A total of 38 species of herbs, belonging to 19 families have been recorded from Ravan Dongar (Figure 5). Out of the 38 species, 17 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 6). Out of these 38 species, that have been recorded, 27 fall under the IUCN category of Not Evaluated, and 11 are of Least Concern (Figure 7). Annexure 1 provides the complete list of species.

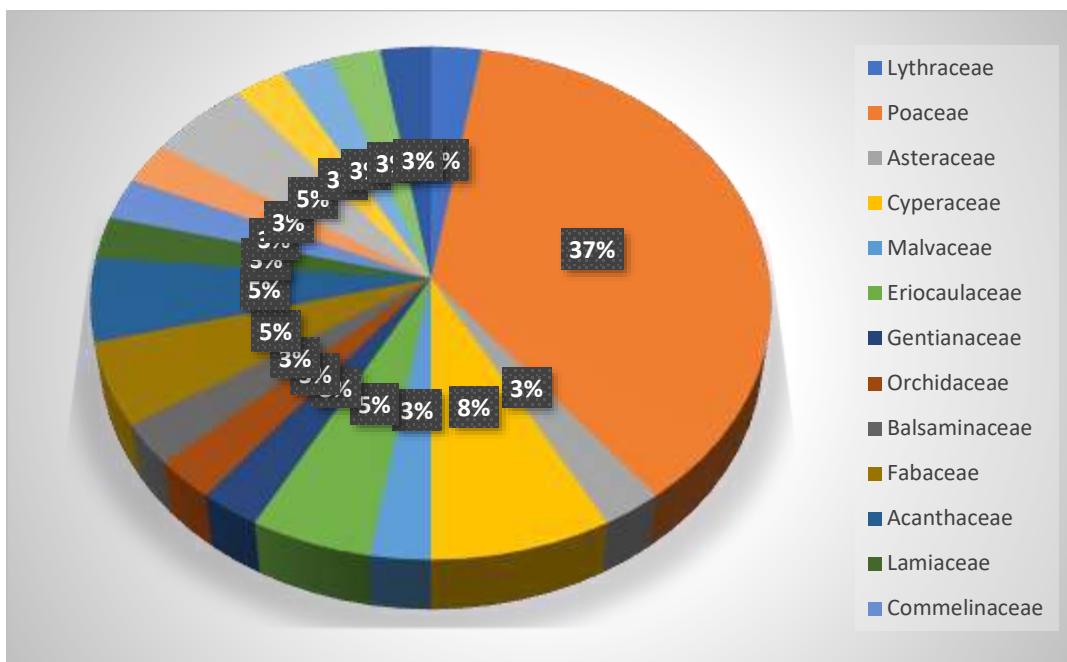


Figure 5: Overview of plant families and representatives recorded from Ravan Dongar

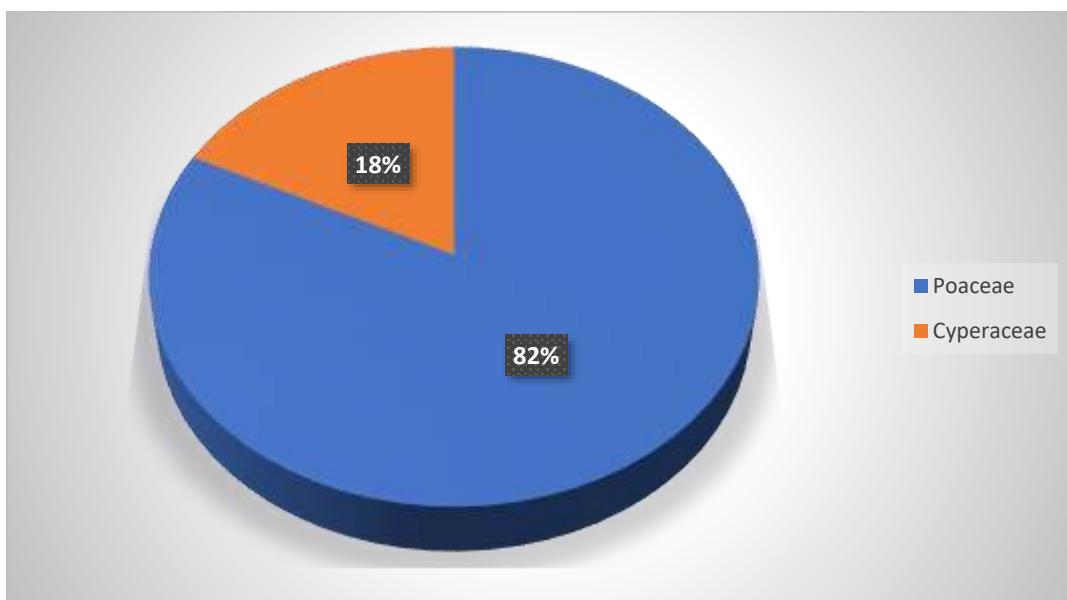


Figure 6: Proportion of representatives of Cyperaceae and Poaceae recorded from Ravan Dongar

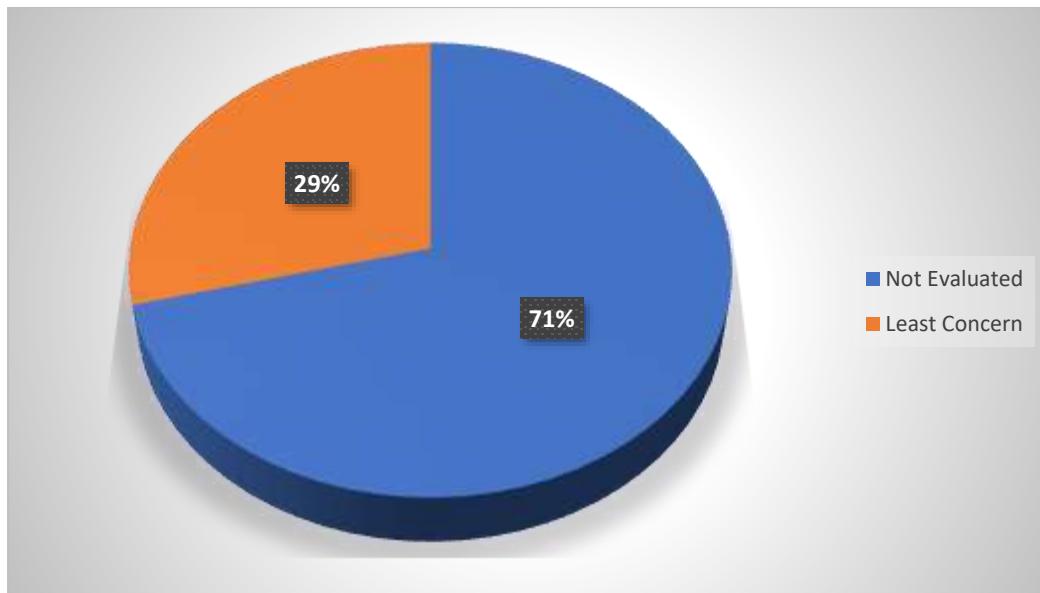


Figure 7: Distribution of herbaceous species recorded from Ravan Dongar, based on IUCN classification

Surla

This grassland falls under a protected area. A total of 34 species of herbs, belonging to 15 families have been recorded from Surla (Figure 8). Out of the 34 species, 17 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 9). Out of these 34 species, that have been recorded, 8 fall under the IUCN category of Not Evaluated, 1 falls under the Vulnerable category and 15 are of Least Concern (Figure 10). Annexure 1 provides the complete list of species.

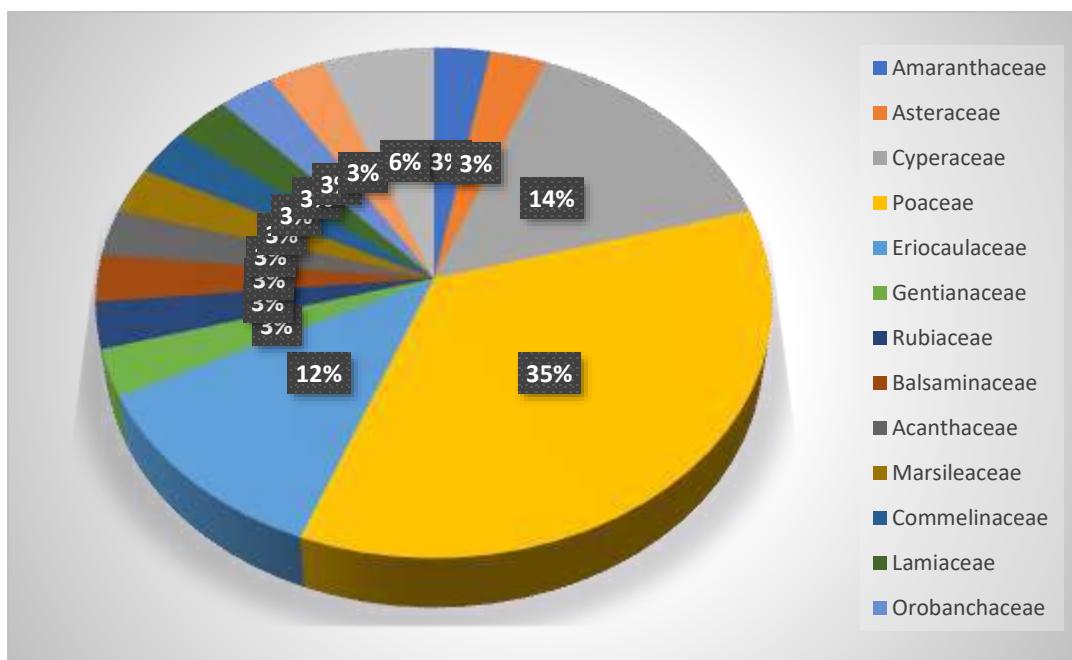


Figure 8: Overview of plant families and representatives recorded from Surla

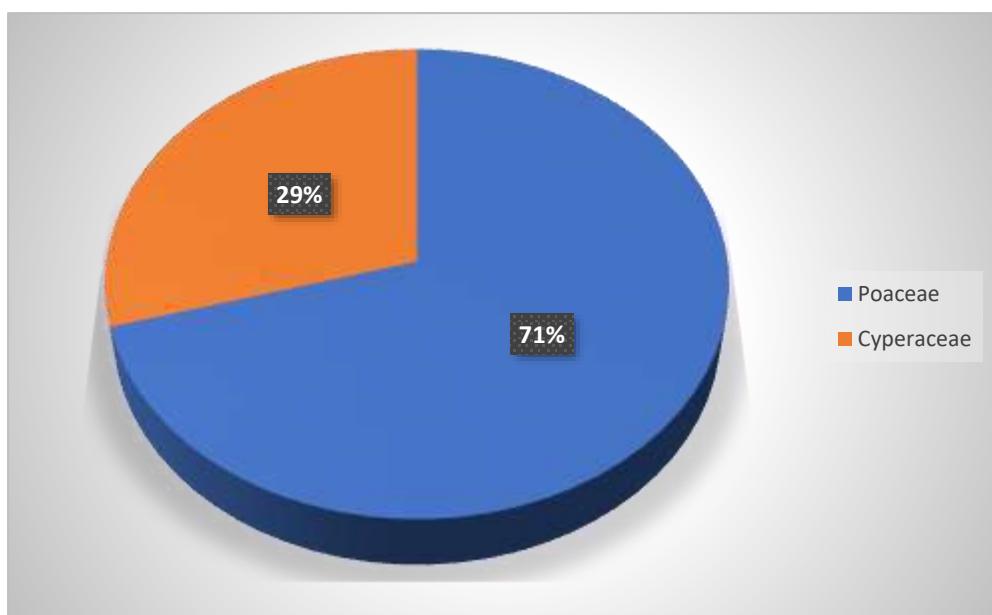


Figure 9: Proportion of representatives of Cyperaceae and Poaceae recorded from Surla

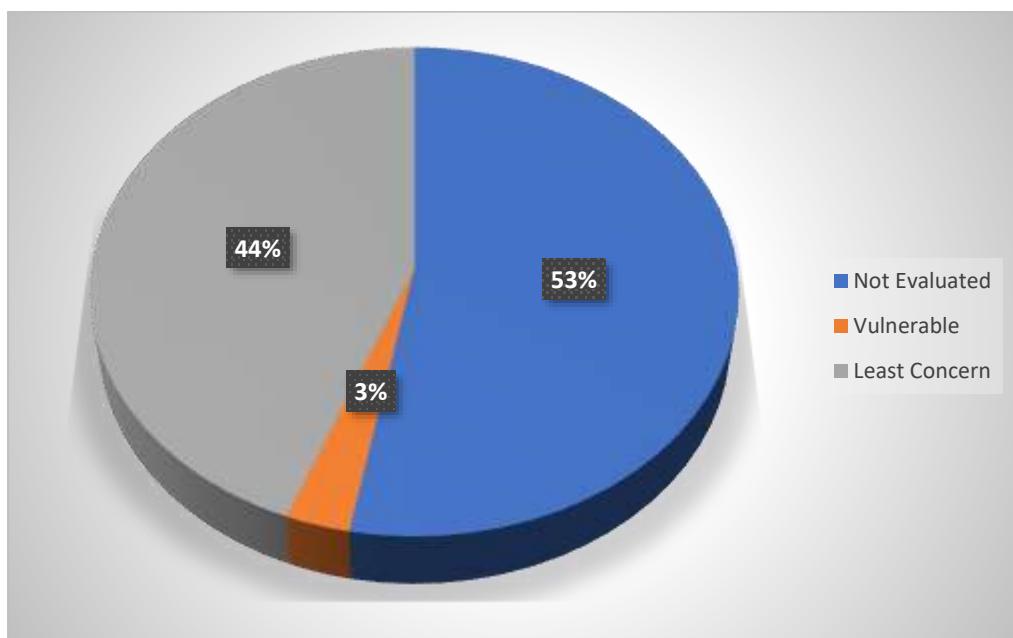


Figure 10: Distribution of herbaceous species recorded from Surla, based on IUCN classification

Pilerne

This grassland does not fall under a protected area. A total of 35 species of herbs, belonging to 13 families have been recorded from Pilerne (Figure 11). Out of the 35 species, 20 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 12). Out of these 35 species, that have been recorded, 20 fall under the IUCN category of Not Evaluated, 2 fall under the Vulnerable category and 13 are of Least Concern (Figure 13). Annexure 1 provides the complete list of species.

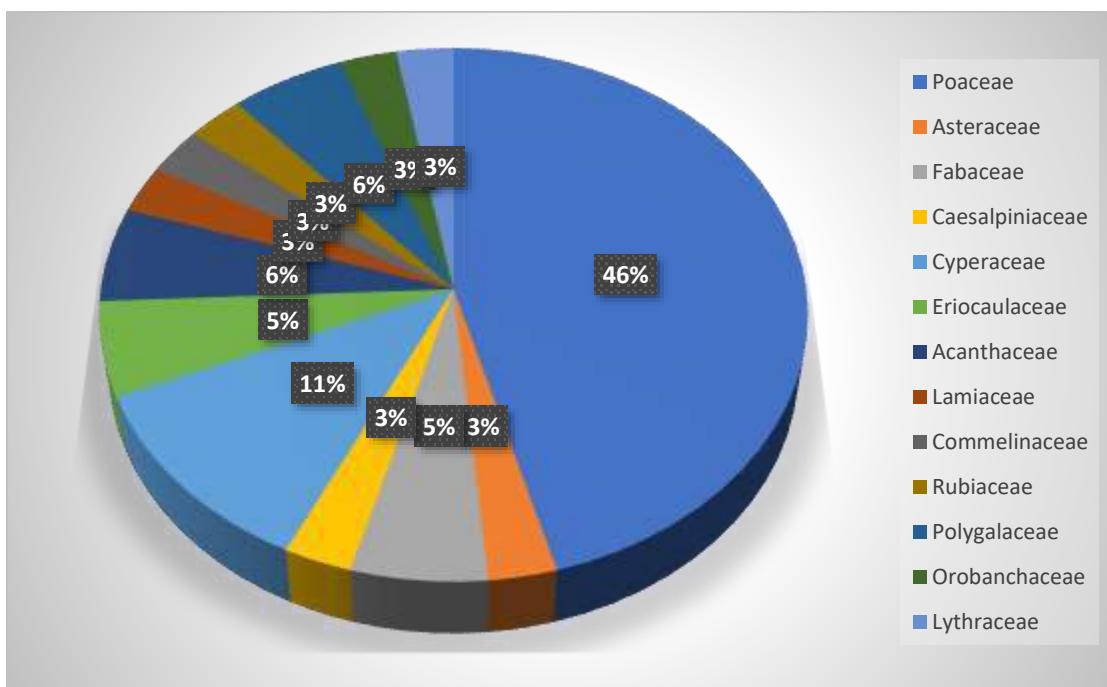


Figure 11: Overview of plant families and representatives recorded from Pilerne

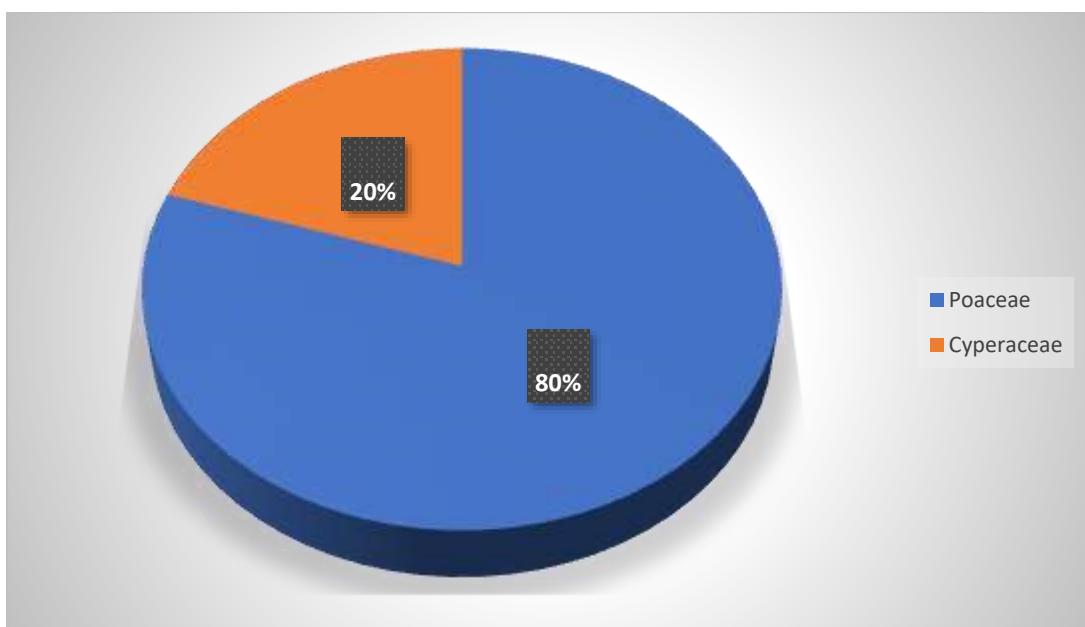


Figure 12: Proportion of representatives of Cyperaceae and Poaceae recorded from Pilerne

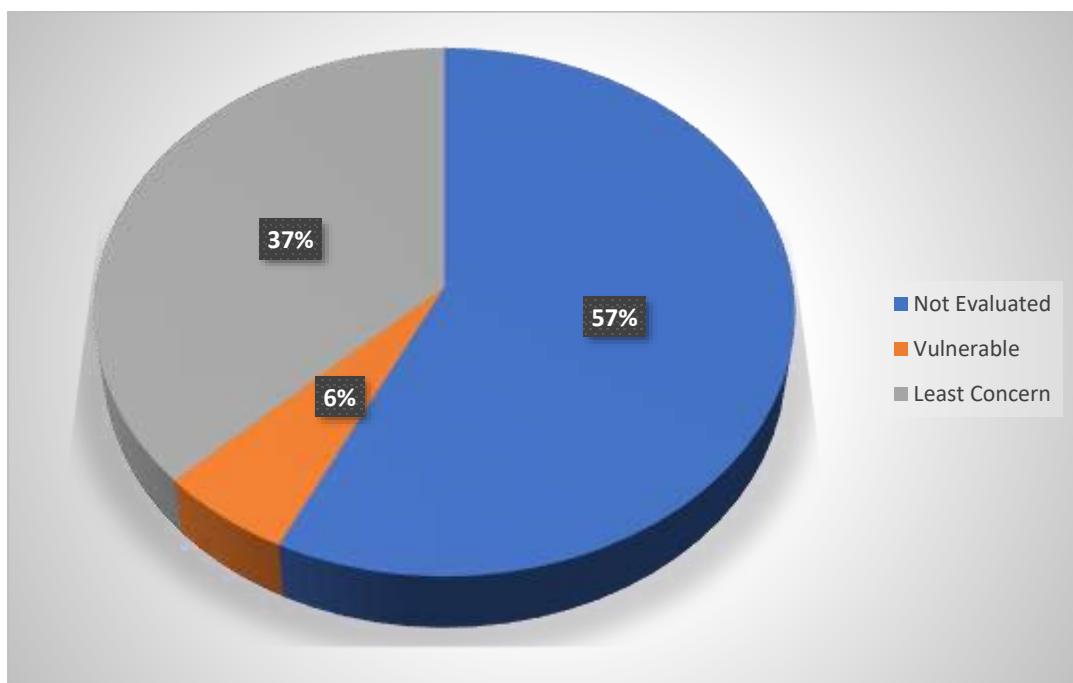


Figure 13: Distribution of herbaceous species recorded from Pilerne, based on IUCN classification

Pale

This grassland does not fall under a protected area. A total of 41 species of herbs, belonging to 18 families have been recorded from Pale (Figure 14). Out of the 41 species, 21 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 15). Out of these 41 species, that have been recorded, 29 fall under the IUCN category of Not Evaluated, 1 falls under the Vulnerable category, 10 are of Least Concern and 1 falls under the Critically Endangered (Figure 16). Annexure 1 provides the complete list of species.

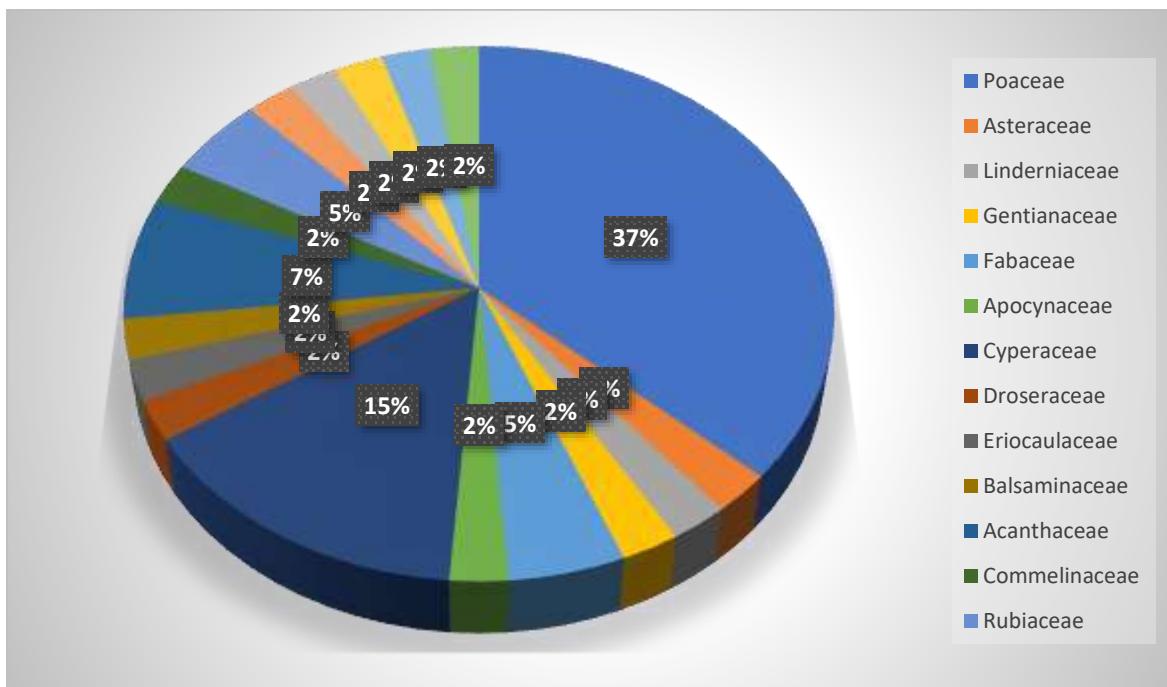


Figure 14: Overview of plant families and representatives recorded from Pale

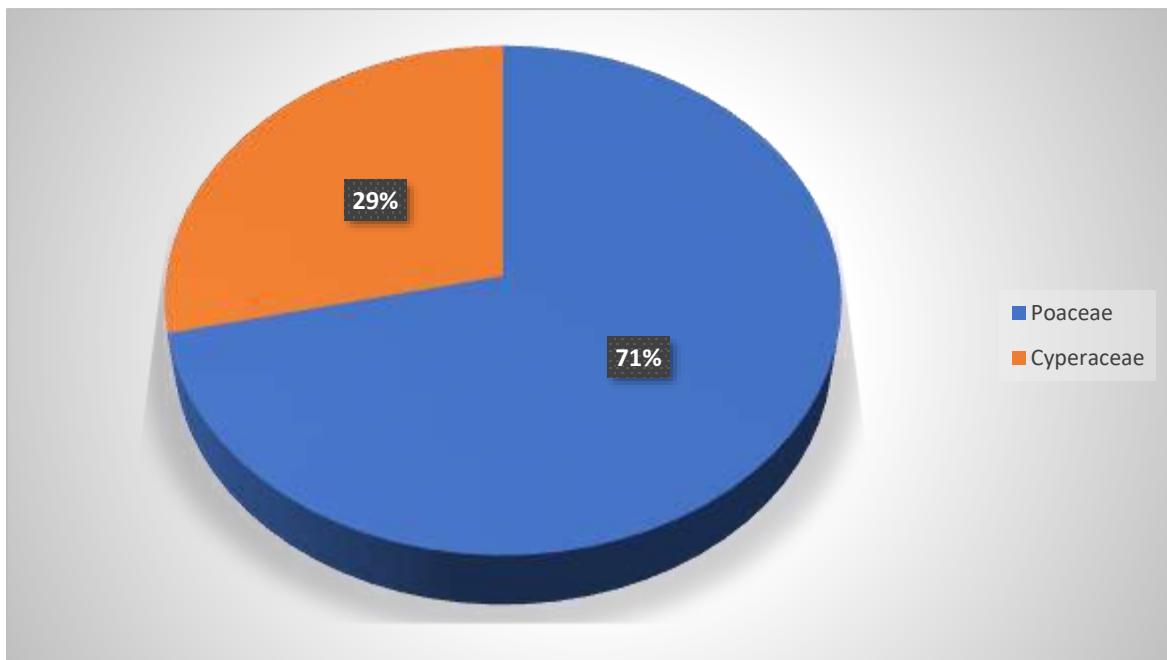


Figure 15: Proportion of representatives of Cyperaceae and Poaceae recorded from Pale

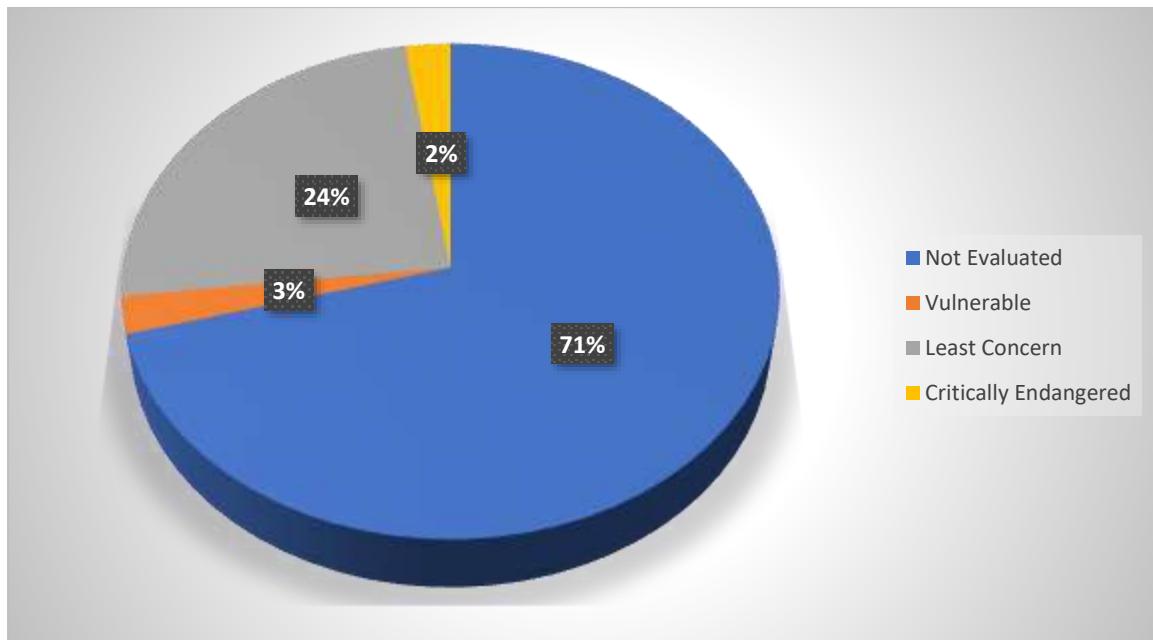


Figure 16: Distribution of herbaceous species recorded from Pale, based on IUCN classification

Mollem

This grassland falls under a protected area. A total of 11 species of herbs, belonging to 5 families have been recorded from Mollem (Figure 17). Out of the 11 species, 8 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 18). Out of these 11 species, that have been recorded, 7 fall under the IUCN category of Not Evaluated, and 4 are of Least Concern (Figure 19). Annexure 1 provides the complete list of species.

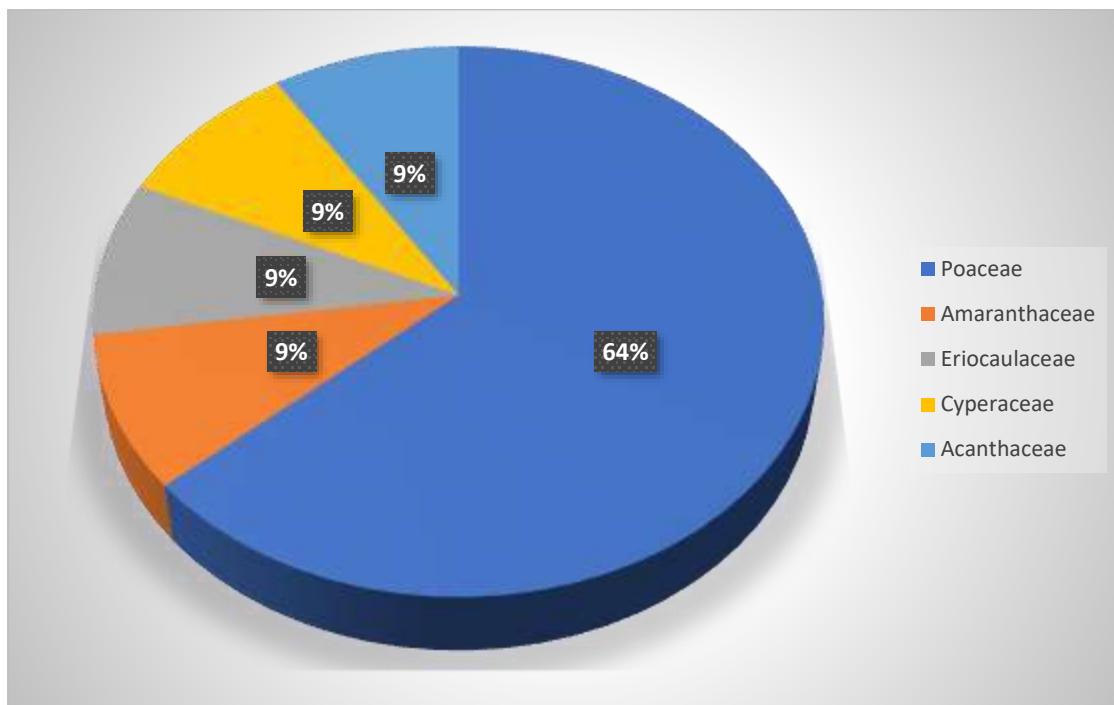


Figure 17: Overview of plant families and representatives recorded from Mollem

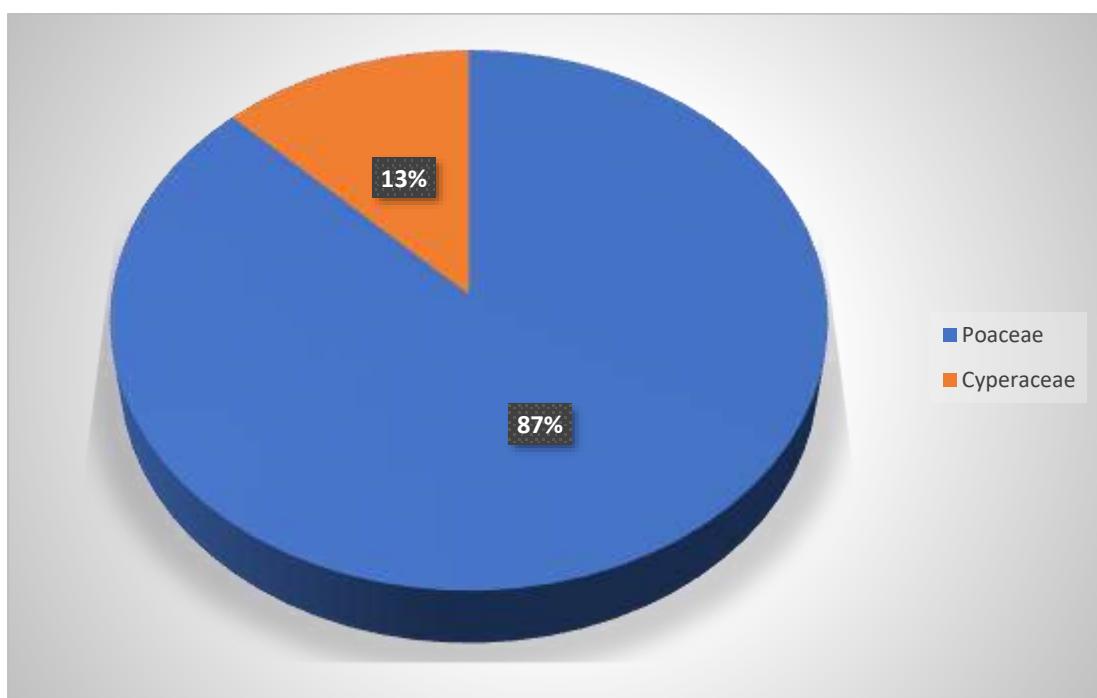


Figure 18: Proportion of representatives of Cyperaceae and Poaceae recorded from Mollem

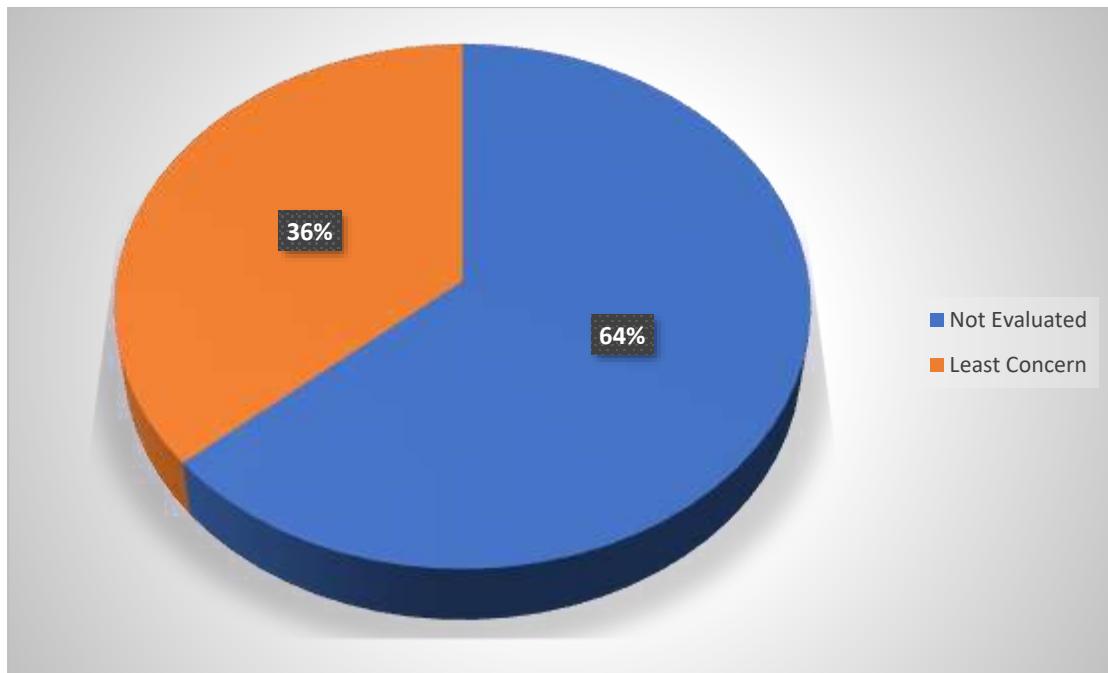


Figure 19: Distribution of herbaceous species recorded from Mollem, based on IUCN classification

Sosogad

This grassland falls under a protected area. A total of 18 species of herbs, belonging to 8 families have been recorded from Sosogad (Figure 20). Out of the 18 species, 10 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 21). Out of these 18 species, that have been recorded, 10 fall under the IUCN category of Not Evaluated, 7 are of Least Concern and 1 is Critically Endangered (Figure 22). Annexure 1 provides the complete list of species.

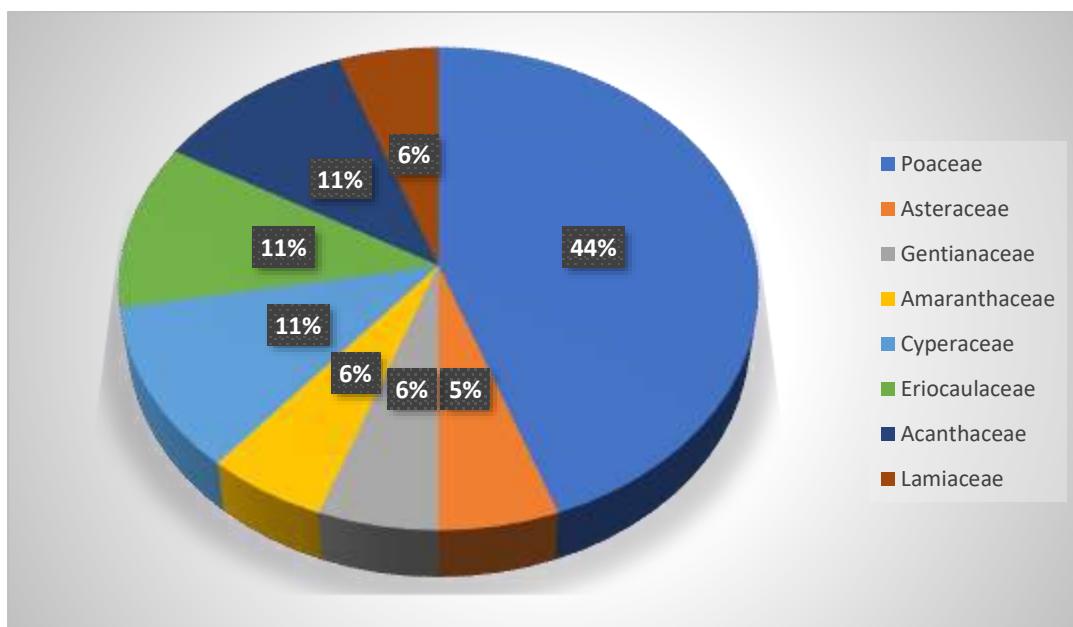


Figure 20: Overview of plant families and representatives recorded from Sosogad

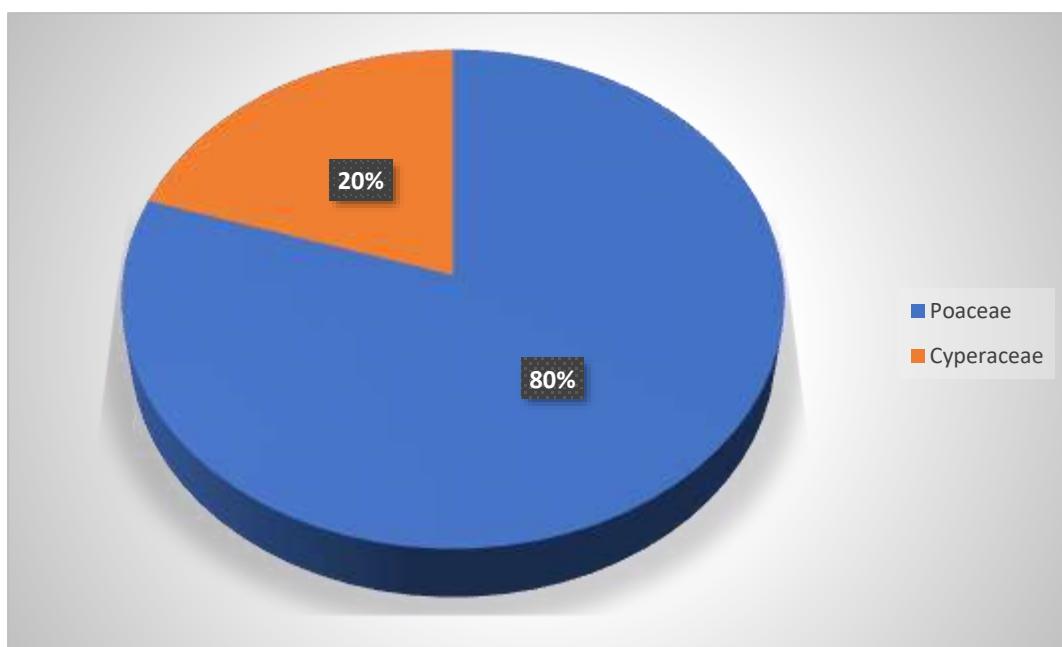


Figure 21: Proportion of representatives of Cyperaceae and Poaceae recorded from Sosogad

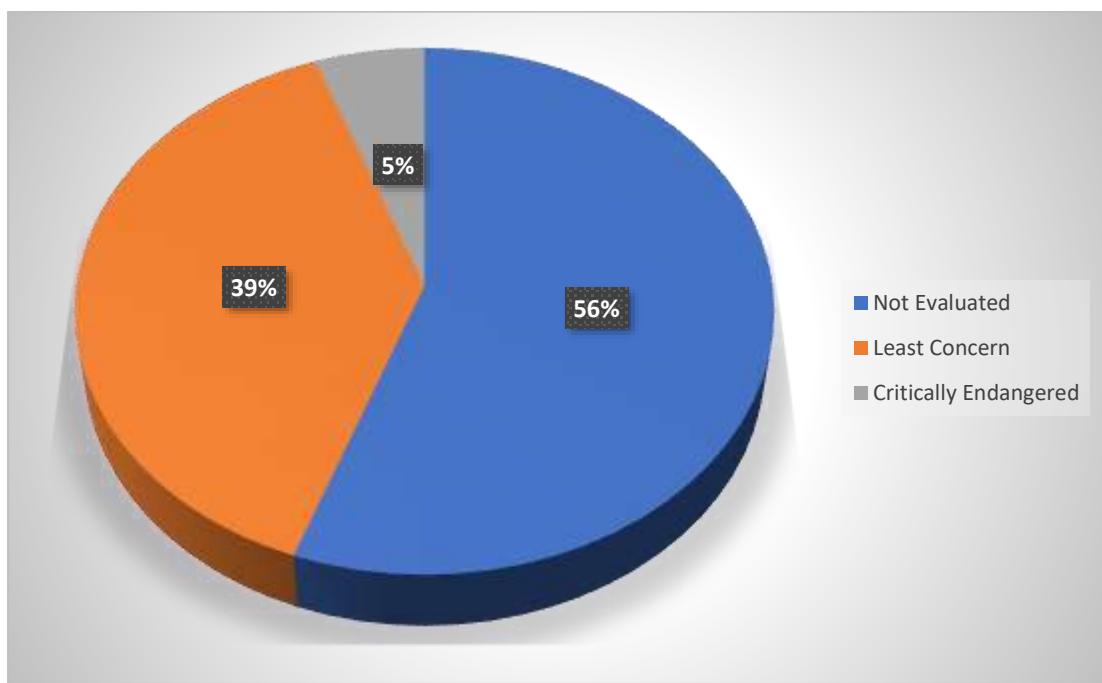


Figure 22: Distribution of herbaceous species recorded from Sosogad, based on IUCN classification

Succoro

This grassland does not fall under a protected area. A total of 59 species of herbs, belonging to 19 families have been recorded from Succoro (Figure 23). Out of the 59 species, 27 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 24). Out of these 59 species, that have been recorded, 32 fall under the IUCN category of Not Evaluated, 3 are of Vulnerable and 24 are of Least Concern (Figure 25). Annexure 1 provides the complete list of species.

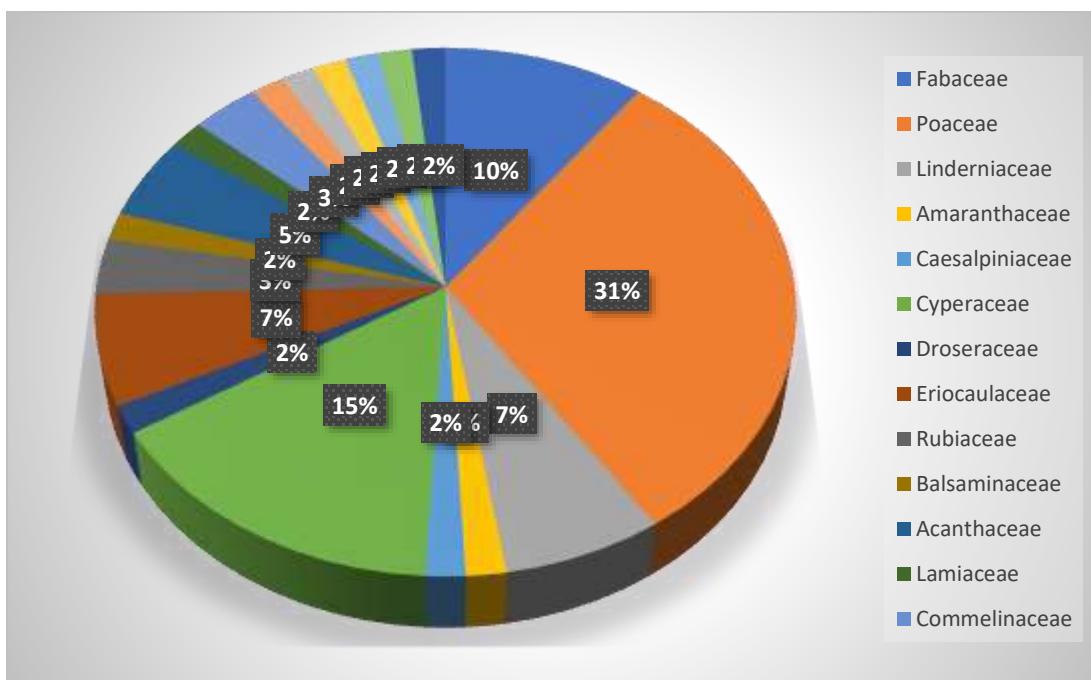


Figure 23: Overview of plant families and representatives recorded from Succoro

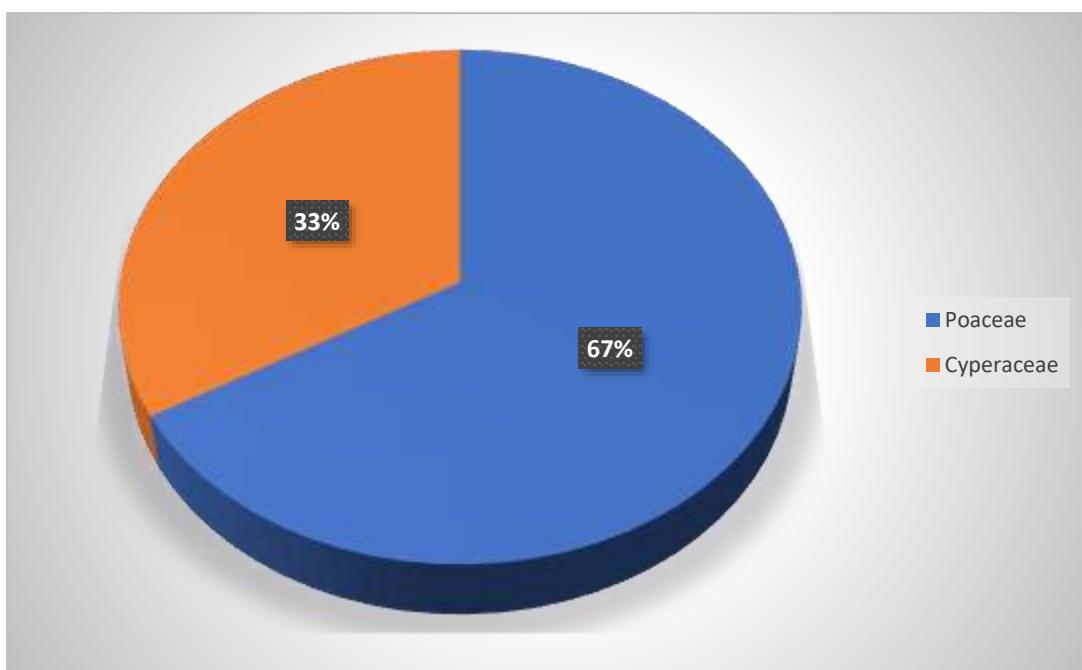


Figure 24: Proportion of representatives of Cyperaceae and Poaceae recorded from Succoro

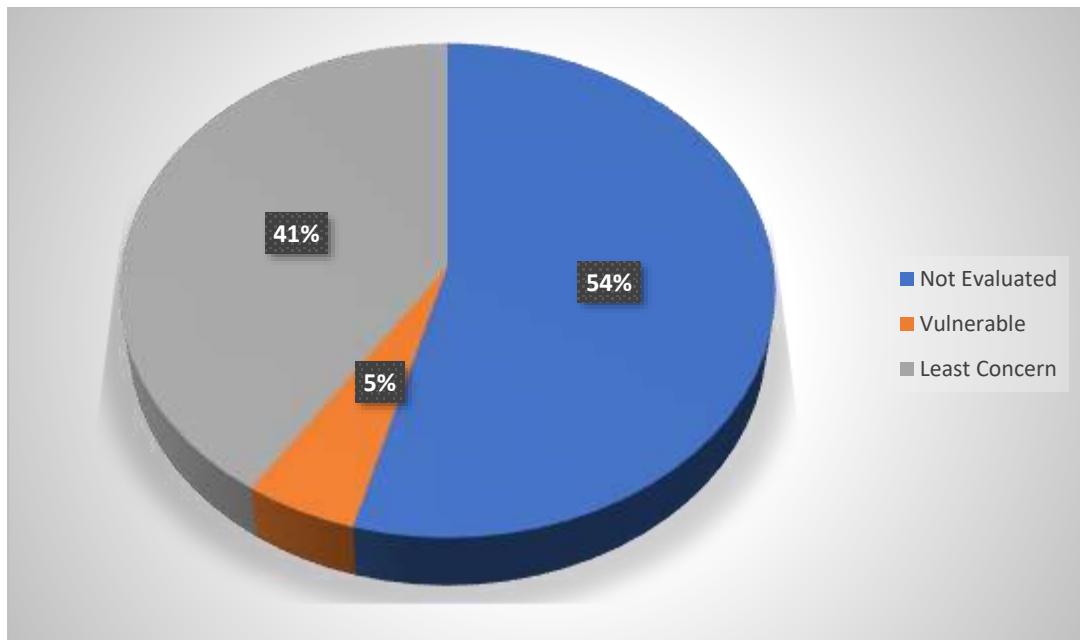


Figure 25: Distribution of herbaceous species recorded from Succoro, based on IUCN classification

Verna

This grassland does not fall under a protected area. A total of 55 species of herbs, belonging to 14 families have been recorded from Verna (Figure 26). Out of the 55 species, 30 species are grasses. Poaceae members dominate over Cyperaceae members. (Figure 27). Out of these 55 species, that have been recorded, 39 fall under the IUCN category of Not Evaluated, 1 falls under Vulnerable category, 14 are of Least Concern and 1 is Critically Endangered (Figure 28). Annexure 1 provides the complete list of species.

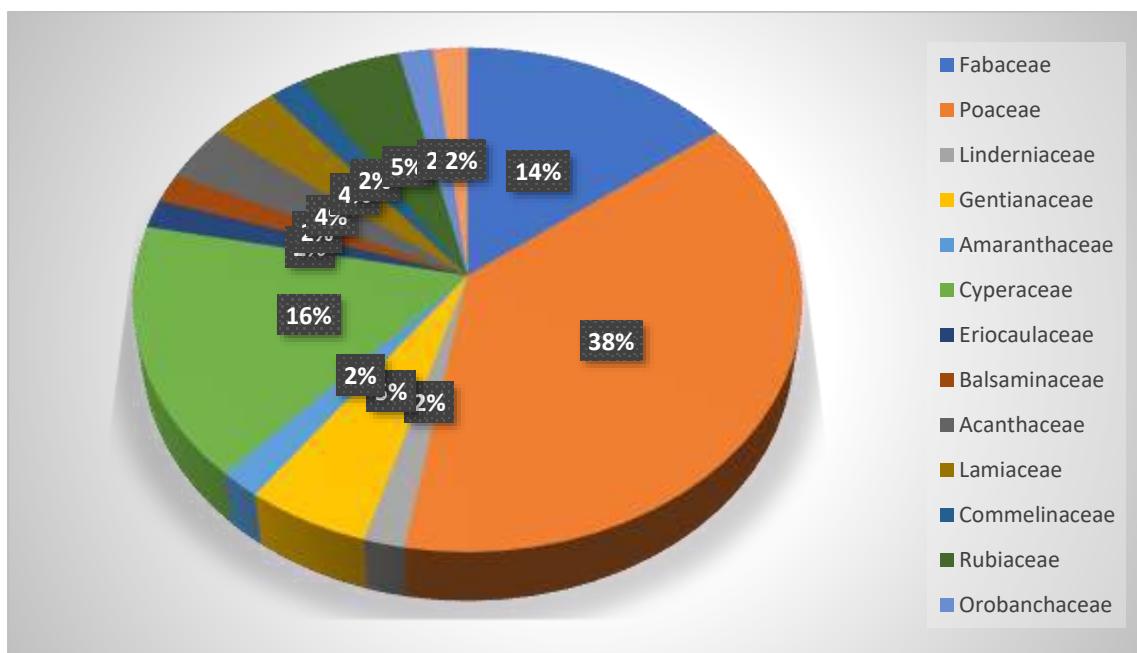


Figure 26: Overview of plant families and representatives recorded from Verna

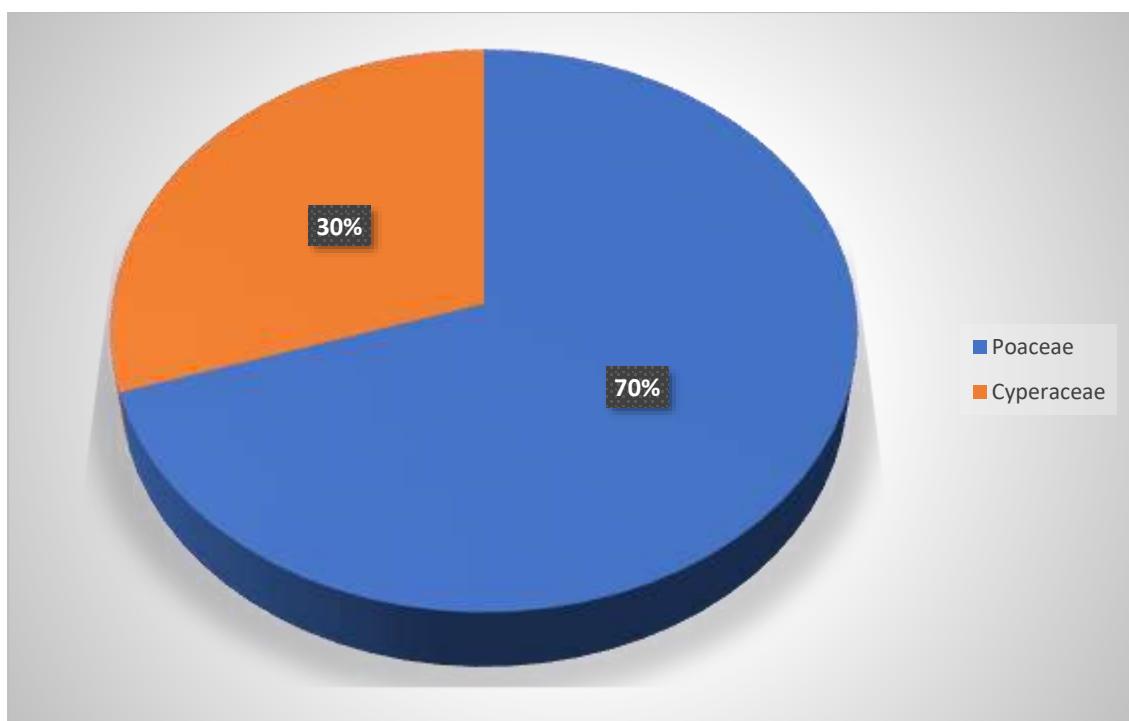


Figure 27: Proportion of representatives of Cyperaceae and Poaceae recorded from Verna

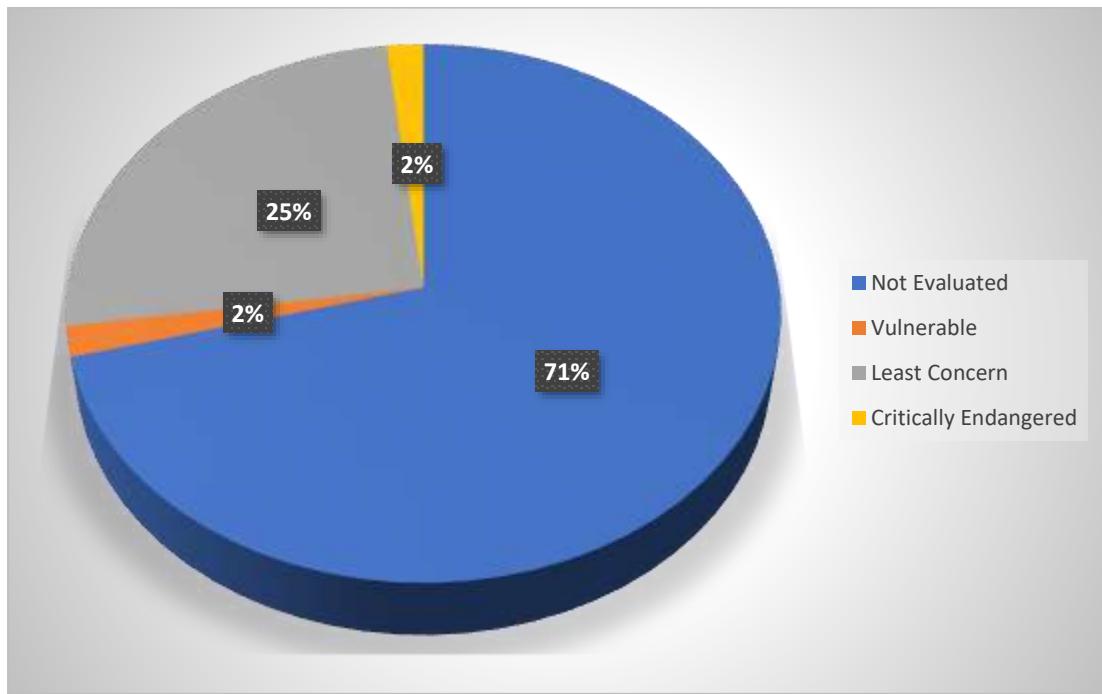


Figure 28: Distribution of herbaceous species recorded from Verna, based on IUCN classification

Shannon Diversity

Shannon Diversity of all the grasslands was calculated. Figure 29 highlights the Shannon Diversity of all the grasslands. Verna has the lowest Shannon Diversity.

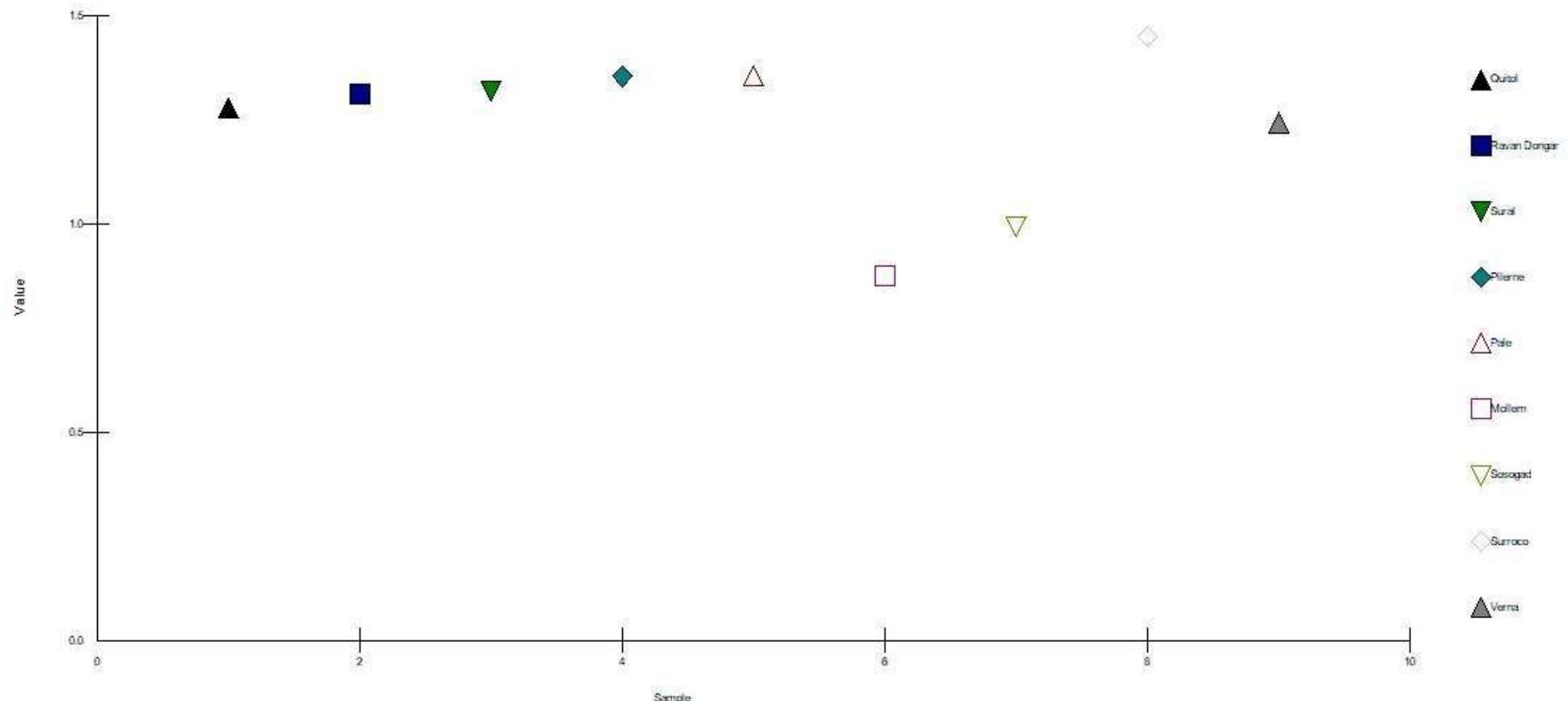


Figure 29: Site-wise Shannon Diversity

Table 3: Shannon Diversity of the different Grasslands

Shannon Diversity	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
	0.809	0.83	0.86	0.877	0.846	0.876	0.79	0.821	0.735

Simpson's Diversity

Simpson's Diversity of all the grasslands was calculated. Figure 30 highlights the Simpson's Diversity of all the grasslands. Pilerne has the lowest Simpson's Diversity.

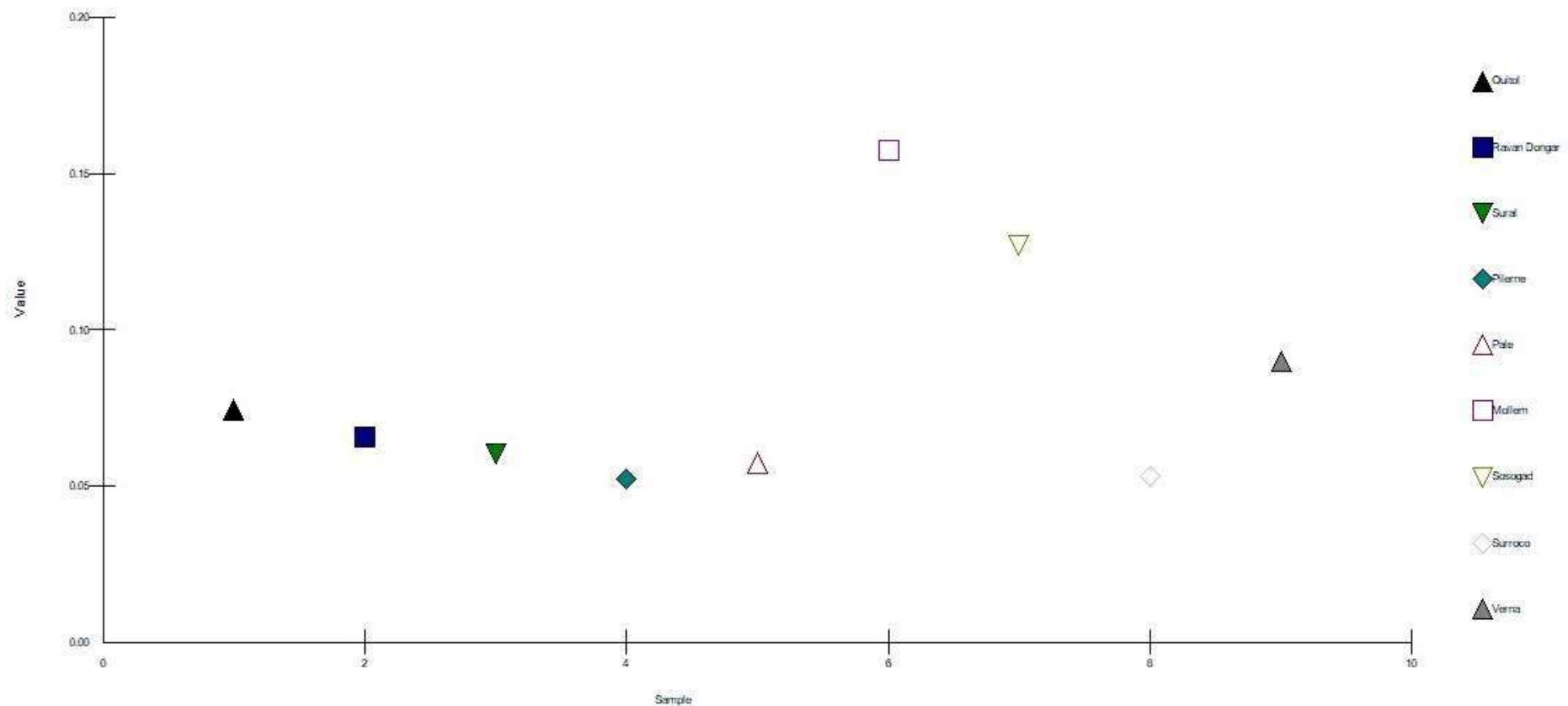


Figure 30: Site-wise Simpson's Diversity

Table 4: Simpson's Diversity of the different Grasslands

Simpson's Diversity	Quitol	Ravan Dongar	Sural	Pilerne	Pale	Mollem	Sosogad	Succoro	Verna
	0.074	0.066	0.06	0.052	0.057	0.157	0.127	0.053	0.09

Bray Curtis Similarity Matrix

Figure 31 represents the Bray Curtis Similarity Matrix. The matrix clearly demarcates the level of closeness between the grasslands with respect to the grass species found in each of them.

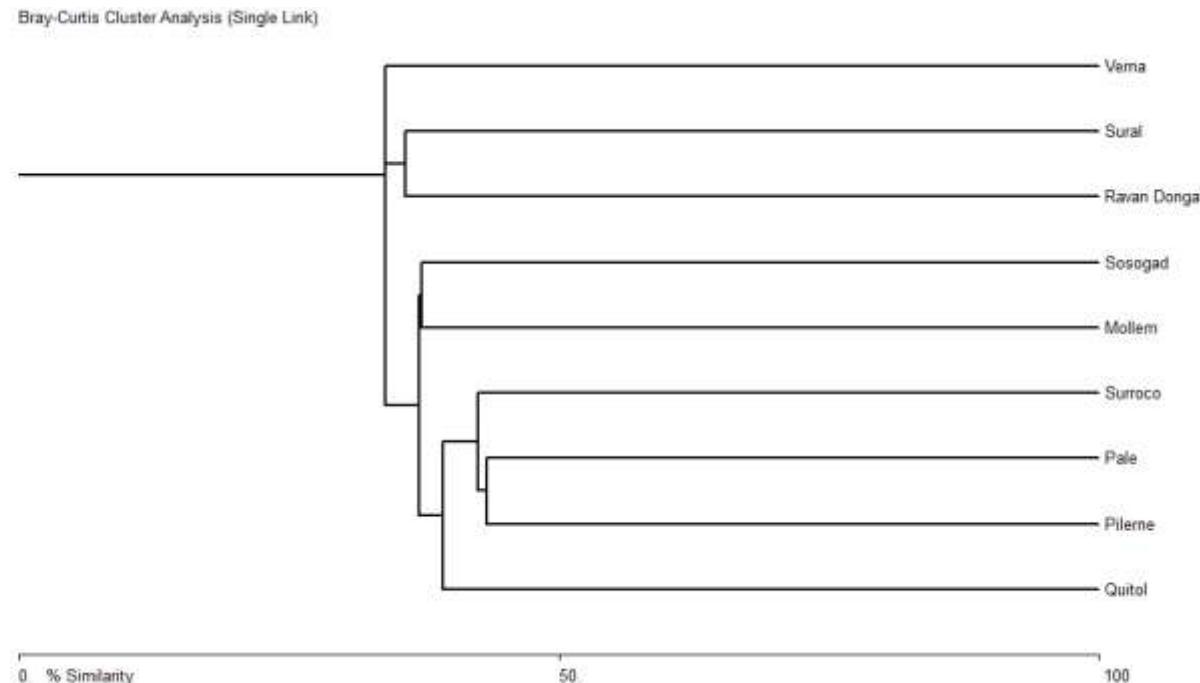
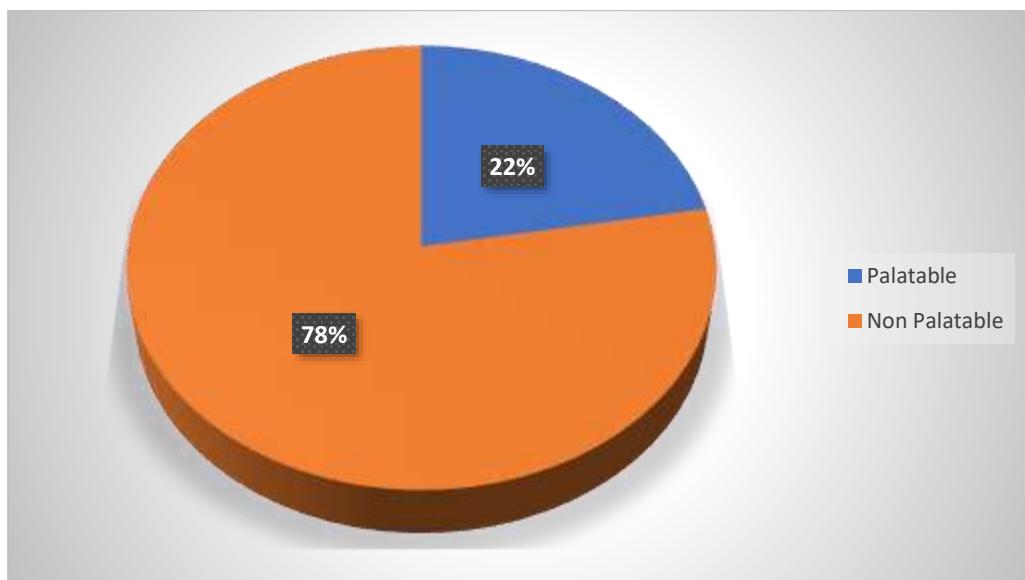


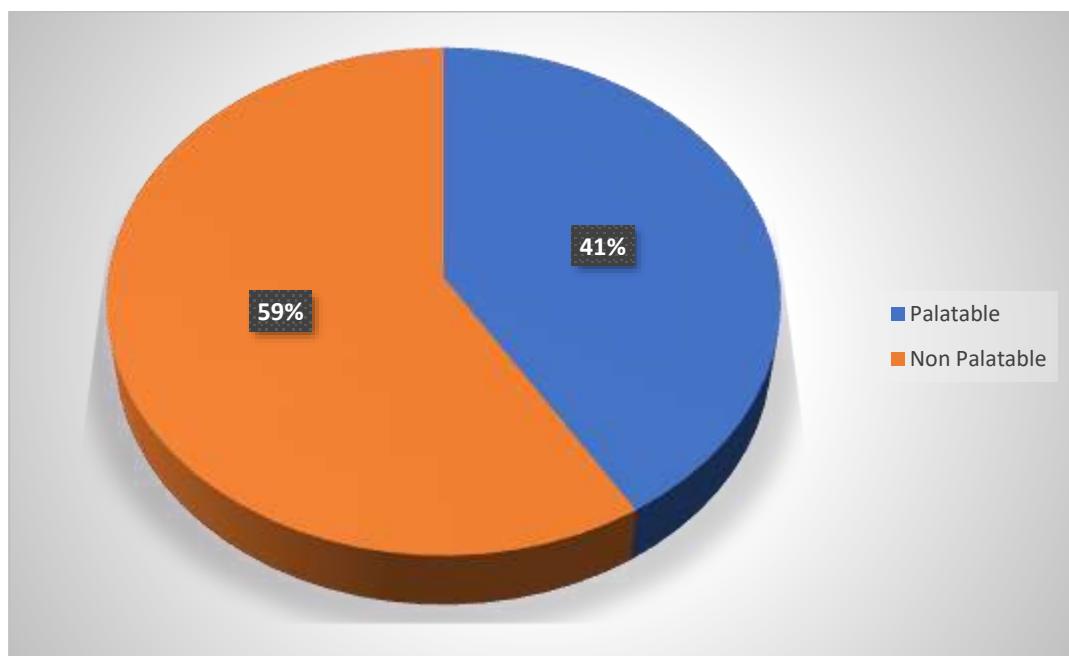
Figure 31: Bray Curtis Similarity Matrix

Objective 2: Palatable and Non-Palatable Grasses

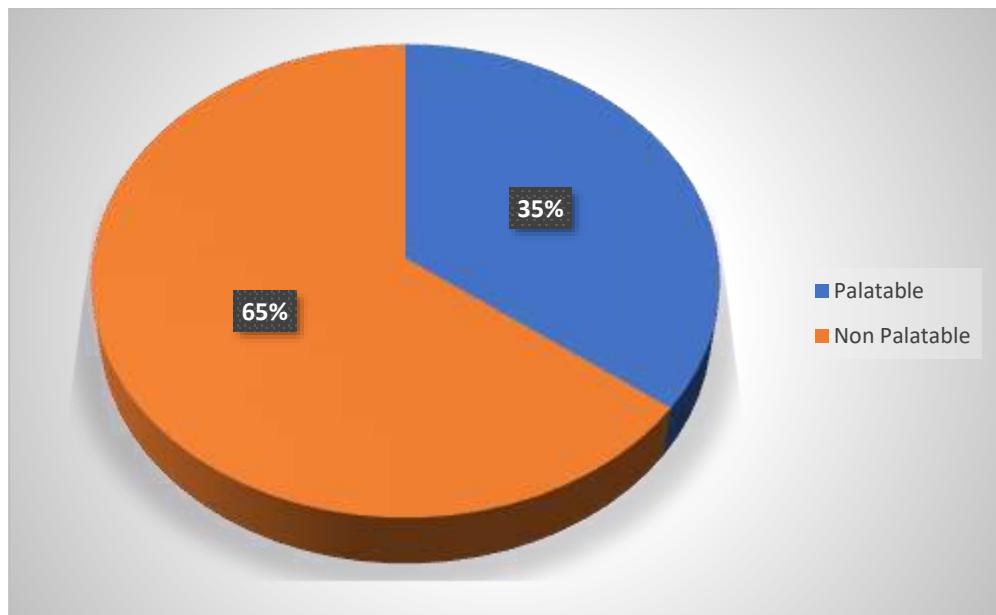
Detailed literature review was conducted to develop site-specific lists of palatable and non-palatable grass species. Please refer Annexure 1 for the lists.



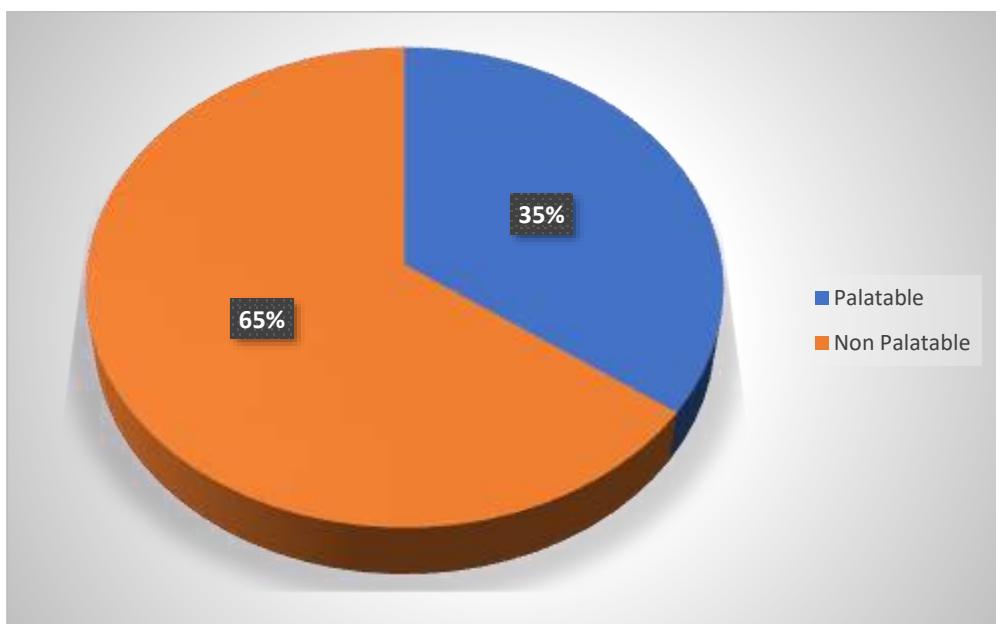
Quitol



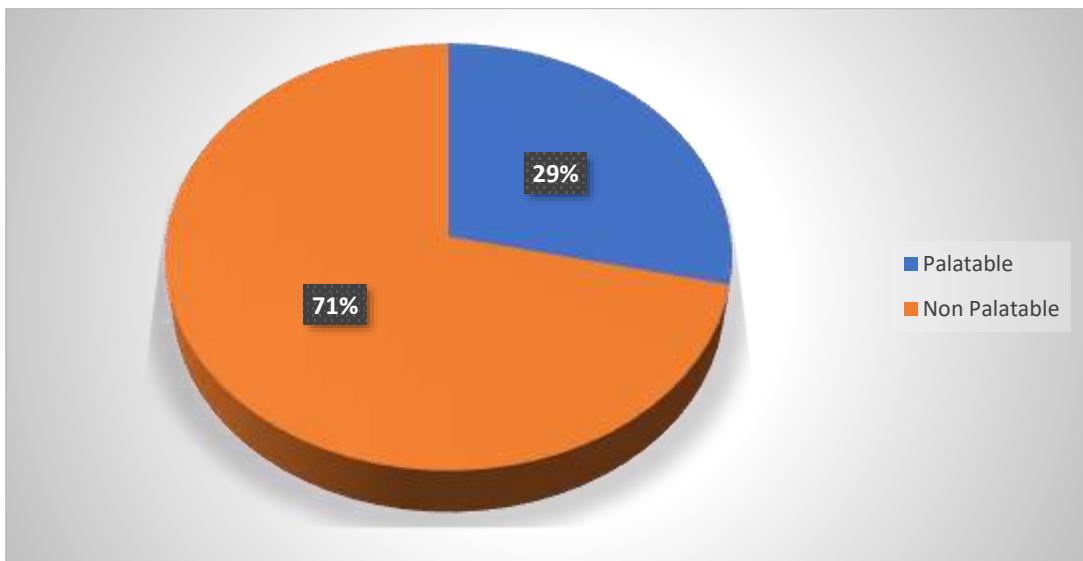
Ravan Dongar



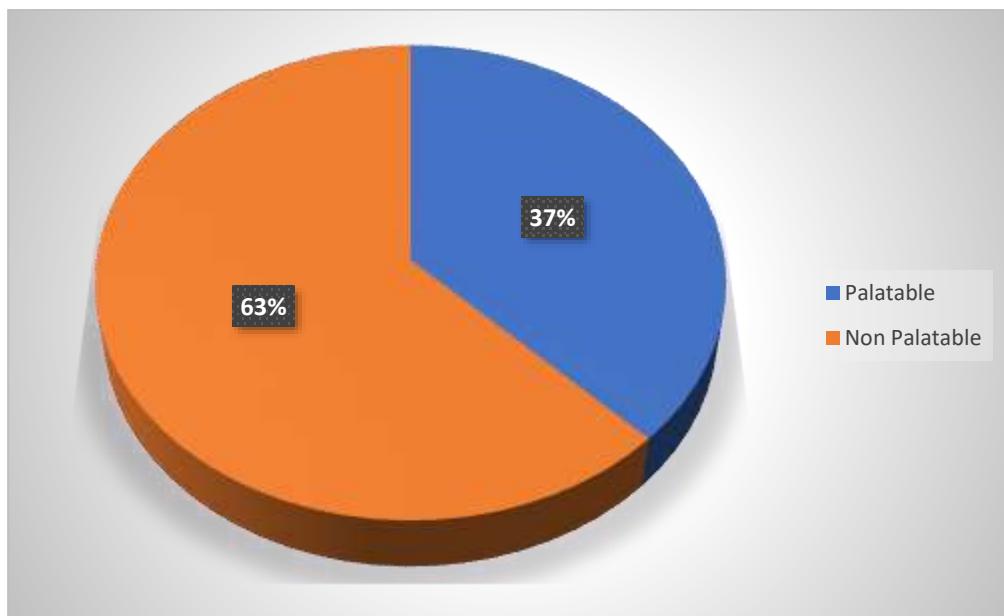
Surla



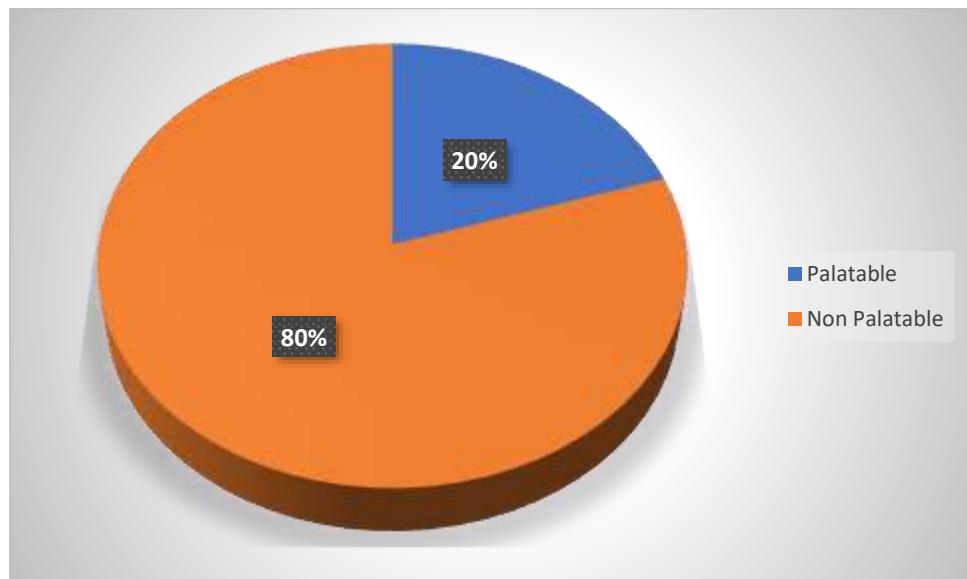
Pilerne



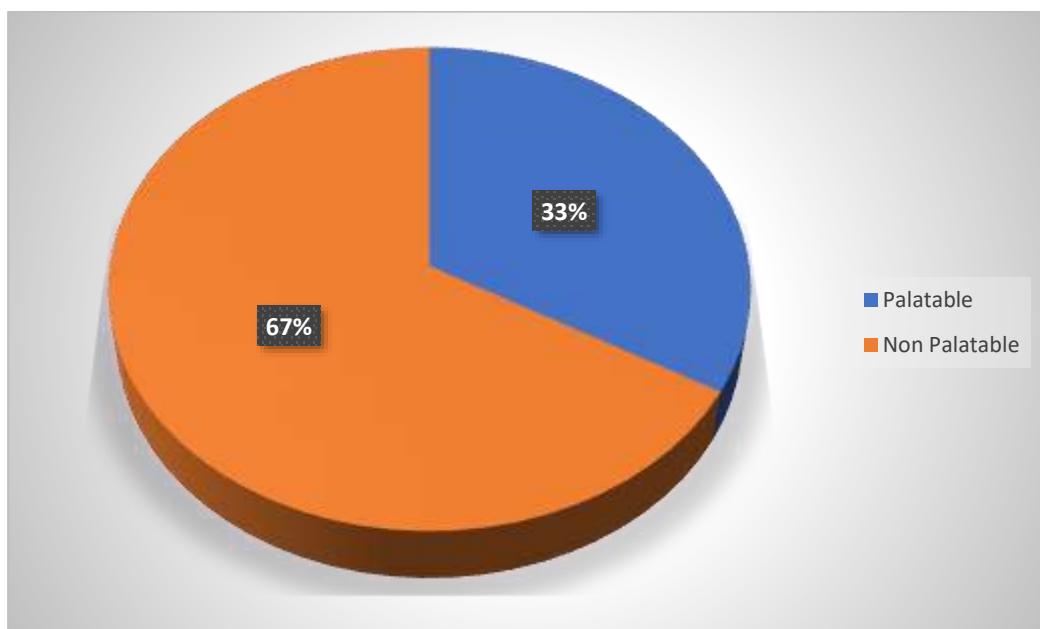
Pale



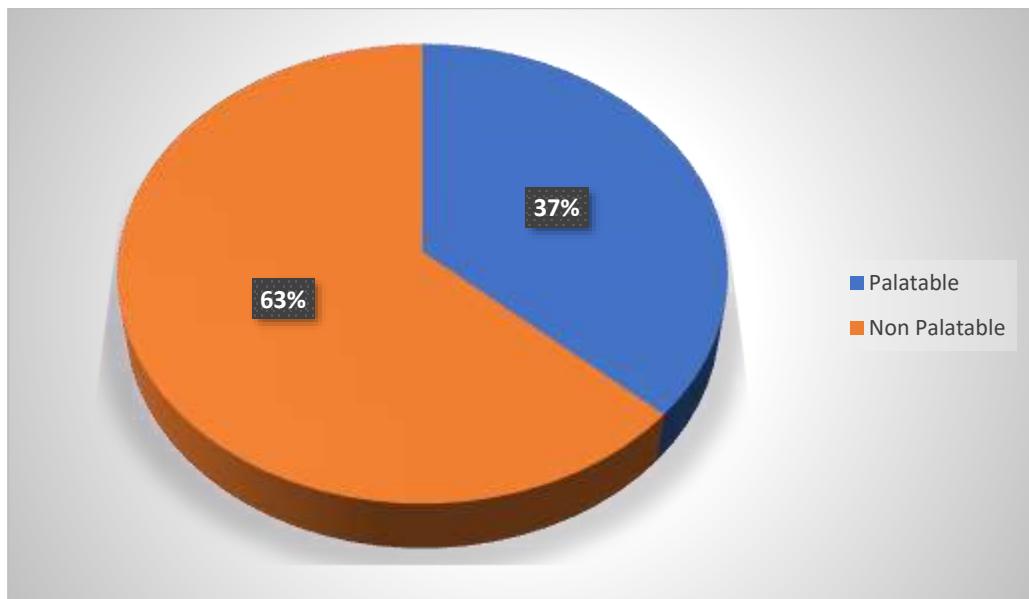
Mollem



Sosogad



Succoro



Verna

Figure 32: Proportion of Palatable and Non-Palatable Grass Species at each Site

Objective 3: Native and Non-Native Grasses

Detailed literature review was conducted to study the nativity of the grass species (refer Annexure 1 for detailed list). All the grass species that have been recorded during the field work are all native species. Absence of non-native grass species in the grasslands is an indicator of the good health of the grasslands in Goa.

Annexure 1: Site-Wise List of Herbaceous Species

Quitol

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Alternanthea pungens</i>	Amaranthaceae	NE		Introduced
<i>Bhidea burnsiana</i>	Poaceae	V		Native
<i>Blumea obliqua</i>	Asteraceae	NE		Native
<i>Bonnaya antipoda</i>	Linderniaceae	LC		Native
<i>Celosia argentea</i>	Amaranthaceae	NE		Introduced
<i>Ceropegia attenuata</i>	Apocynaceae	NE		Native
<i>Chamaecrista mimosoides</i>	Caesalpiniaceae	LC		Native
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Dactyloctenium aegypticum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Enicostema verticillatum</i>	Gentianaceae	NE		Introduced
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis miliacea</i>	Cyperaceae	NE		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Geissaspis cristata</i>	Fabaceae	LC		Native
<i>Glyphochloa divergens</i>	Poaceae	V		Native
<i>Indigofera tinctoria</i>	Fabaceae	NE		Introduced
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Ischaemum indicum</i>	Poaceae	NE		Native
<i>Ischaemum manilaliana</i>	Poaceae	NE		Native
<i>Ischaemum molle</i>	Poaceae	LC		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Murdannia edulis</i>	Commelinaceae	NE		Native
<i>Neanotis foetida</i>	Rubiaceae	NE		Native
<i>Panicum notatum</i>	Poaceae	NE		Native
<i>Paspalum conjugatum</i>	Poaceae	LC		Native
<i>Rhamphicarpa fistulosa</i>	Orobanchaceae	LC		Native
<i>Rhynchospora wightiana</i>	Cyperaceae	NE		Native
<i>Rostellularia procumbens</i>	Acanthaceae	NE		Native
<i>Rotala indica</i>	Lythraceae	LC		Native
<i>Setaria pallidefusca</i>	Poaceae	NE		Native
<i>Smithia sensitiva</i>	Fabaceae	LC		Native
<i>Spermacoce articularis</i>	Rubiaceae	NE		Native
<i>Spermacoce ocymoides</i>	Rubiaceae	NE		Native
<i>Urena lobata</i>	Malvaceae	LC		Native

<i>Zornia gibbosa</i>	Fabaceae	NE		Native
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Ravan Dongar

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Ammannia gracilis</i>	Lythraceae	NE		Introduced
<i>Apluda mutica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arthraxon lancifolius</i>	Poaceae	NE		Native
<i>Arundinella leptochloa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle	Native
<i>Blumea obliqua</i>	Asteraceae	NE		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Dichaschistia trilobata</i>	Malvaceae	NE		Native
<i>Eriocaulon eurypeplon</i>	Eriocaulaceae	LC		Native
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Eulalia trispicata</i>	Poaceae	NE	Palatable; cattle, nilgai	Native
<i>Exacum pumilum</i>	Gentianaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Habenaria heyneana</i>	Orchidaceae	NE		Native
<i>Impatiens balsamina</i>	Balsaminaceae	NE		Native
<i>Indigofera tinctoria</i>	Fabaceae	NE		Introduced
<i>Ischaemum indicum</i>	Poaceae	LC		Native
<i>Ischaemum manilaliana</i>	Poaceae	NE		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Jansenella griffithiana</i>	Poaceae	NE		Native
<i>Lepidagathis fasciculata</i>	Acanthaceae	NE		Native
<i>Leucas aspera</i>	Lamiaceae	NE		Native
<i>Murdannia edulis</i>	Commelinaceae	NE		Native
<i>Neanotis subtilis</i>	Rubiaceae	NE		Native
<i>Panicum psilopodium</i>	Poaceae	LC		Native
<i>Parasopubia hofmannii</i>	Orobanchaceae	NE		Native
<i>Paspalum canarae</i>	Poaceae	LC		Native
<i>Paspalum conjugatum</i>	Poaceae	LC		Native
<i>Paspalum flavidium</i>	Poaceae	LC	Palatable, cattle	Native
<i>Polygala erecta</i>	Polygalaceae	NE		Native
<i>Portulaca grandiflora</i>	Portulacaceae	NE		Introduced
<i>Rostellularia procumbens</i>	Acanthaceae	NE		Native
<i>Selaginella kraussiana</i>	Selaginellaceae	NE		Introduced
<i>Smithia sensitiva</i>	Fabaceae	LC		Native
<i>Sopubia delphinifolia</i>	Orobanchaceae	NE		Native

<i>Themeda tremula</i>	Poaceae	NE	Palatable; cattle	Native
<i>Utricularia malabarica</i>	Lentibulariaceae	NE		Native

Surla

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Alternanthea pungens</i>	Amaranthaceae	NE		Introduced
<i>Blumea obliqua</i>	Asteraceae	NE		Native
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Danthonidium gammie</i>	Poaceae	NE		Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Eriocaulon eurypeplon</i>	Eriocaulaceae	LC		Native
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Eriocaulon stellulatum</i>	Eriocaulaceae	LC		Native
<i>Eriocaulon tuberiferum</i>	Eriocaulaceae	V		Native
<i>Exacum pumilum</i>	Gentianaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Hedyotis corymbosa</i>	Rubiaceae	NE		Native
<i>Impatiens balsamina</i>	Balsaminaceae	NE		Native
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Ischaemum indicum</i>	Poaceae	NE		Native
<i>Ischaemum manilaliana</i>	Poaceae	NE		Native
<i>Ischaemum santapaui</i>	Poaceae	NE		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Janasenella griffithiana</i>	Poaceae	NE		Native
<i>Kyllinga nemoralis</i>	Cyperaceae	LC		Native
<i>Lepidagathis fasciculata</i>	Acanthaceae	NE		Native
<i>Marsilea quadrifolia</i>	Marsileaceae	LC		Introduced
<i>Murdannia edulis</i>	Commelinaceae	NE		Native
<i>Panicum auritum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Paspalum canarae</i>	Poaceae	LC		Native
<i>Pogostemon deccanensis</i>	Lamiaceae	NE		Native
<i>Rhamphicarpa fistulosa</i>	Orobanchaceae	LC		Native
<i>Rotala indica</i>	Lythraceae	LC		Native
<i>Sacciolepis indica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Utricularia malabarica</i>	Lentibulariaceae	NE		Native
<i>Utricularia reticulata</i>	Lentibulariaceae	LC		Native

Pilerne

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Apluda mutica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle	Native
<i>Bhidea burnsiana</i>	Poaceae	V		Native
<i>Blumea obliqua</i>	Asteraceae	NE		Native
<i>Cajanus cajan</i>	Fabaceae	NE		Native
<i>Chamecrista mimusoides</i>	Caesalpiniaceae	LC		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Dimeria veldkampii</i>	Poaceae	NE		Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Eriocaulon eurypeplon</i>	Eriocaulaceae	LC		Native
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Geissaspis cristata</i>	Fabaceae	LC		Native
<i>Glyphochloa divergens</i>	Poaceae	V		Native
<i>Heteropogon contortus</i>	Poaceae	NE	Palatable; cattle	Native
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Ischaemum indicum</i>	Poaceae	LC		Native
<i>Ischaemum janarthanamii</i>	Poaceae	NE		Native
<i>Ischaemum manilaliana</i>	Poaceae	NE		Native
<i>Ischaemum molle</i>	Poaceae	LC		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Lepidagathis cuspidata</i>	Acanthaceae	NE		Native
<i>Leucas aspera</i>	Lamiaceae	NE		Native
<i>Murdannia edulis</i>	Commelinaceae	NE		Native
<i>Neoanotis foetida</i>	Rubiaceae	NE		Native
<i>Panicum notatum</i>	Poaceae	NE		Native
<i>Paspalum canarae</i>	Poaceae	LC		Native
<i>Polygala erecta</i>	Polygalaceae	NE		Native
<i>Rhamphicarpa fistulosa</i>	Orobanchaceae	LC		Native
<i>Rhynchospora wightiana</i>	Cyperaceae	NE		Native
<i>Rostellularia procumbens</i>	Acanthaceae	NE		Native
<i>Rotala indica</i>	Lythraceae	LC		Native
<i>Salomonia ciliata</i>	Polygalaceae	NE		Native
<i>Themeda tremula</i>	Poaceae	NE	Palatable; cattle	Native

Pale

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Apluda mutica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arundinella metzii</i>	Poaceae	NE		Native
<i>Arundinella tuberculata</i>	Poaceae	NE		Native
<i>Bhidea burnsiana</i>	Poaceae	V		Native
<i>Chrysopogon aciculatus</i>	Poaceae	NE	Palatable; cattle	Native
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Cyperus squarrosus</i>	Cyperaceae	LC		Native
<i>Dimeria veldkampii</i>	Poaceae	NE		Native
<i>Dimeria woodrowi</i>	Poaceae	NE		Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis miliacea</i>	Cyperaceae	NE		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Ischaemum indicum</i>	Poaceae	LC		Native
<i>Ischaemum janarthanamii</i>	Poaceae	NE		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE		Native
<i>Ischaemum semisagittatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Panicum auritum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Panicum notatum</i>	Poaceae	NE		Native
<i>Rhynchospora wightiana</i>	Cyperaceae	NE		Native
<i>Rostellularia procumbens</i>	Acanthaceae	NE		Native
<i>Sesamum indicum</i>	Pedaliaceae	NE		Native
<i>Spermacoce ocymoides</i>	Rubiaceae	NE		Native
<i>Themeda tremula</i>	Poaceae	NE	Palatable; cattle	Native
<i>Utricularia reticulata</i>	Lentibulariaceae	LC		Native

Mollem

Name of species	Family	IUCN status	Palatable		Native or not
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle		Native
<i>Celosia argentea</i>	Amaranthaceae	LC			Introduced
<i>Dimeria veldkampii</i>	Poaceae	NE			
<i>Dimeria woodrowi</i>	Poaceae	NE			Native
<i>Eriocaulon goanense</i>	Eriocaulaceae	NE			Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC			Native
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle		Native
<i>Ischaemum indicum</i>	Poaceae	LC			Native
<i>Lepidagathis cuspidata</i>	Acanthaceae	NE			Native
<i>Ophiurus bombaiensis</i>	Poaceae	NE			Native
<i>Themeda tremula</i>	Poaceae	NE	Palatable; cattle		Native

Sosogad

Name of species	Family	IUCN status	Palatable	Native or not
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle	Native
<i>Blumea obliqua</i>	Asteraceae	NE		Native
<i>Canscora shrirangiana</i>	Gentianaceae	CE		Native
<i>Celosia argentea</i>	Amaranthaceae	LC		Introduced
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Danthonidium gammie</i>	Poaceae	NE		Native
<i>Dimeria veldkampii</i>	Poaceae	NE		Native
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Eriocaulon stellulatum</i>	Eriocaulaceae	LC		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Ischaemum indicum</i>	Poaceae	LC		Native
<i>Jansenella griffithiana</i>	Poaceae	NE		Native
<i>Justicia latifolia</i>	Acanthaceae	NE		Native
<i>Lepidagathis cuspidata</i>	Acanthaceae	NE		Native
<i>Ophiuros bombaiensis</i>	Poaceae	NE		Native
<i>Paspalum canarae</i>	Poaceae	LC		Native
<i>Pogostemon deccanensis</i>	Lamiaceae	NE		Native

Succoro

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Alysicarpus naikianus</i>	Fabaceae	LC		Native
<i>Alysicarpus vaginalis</i>	Fabaceae	NE		Native
<i>Apluda mutica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle	Native
<i>Bhidea burnsiana</i>	Poaceae	V		Native
<i>Bonnaya antipoda</i>	Linderniaceae	LC		Native
<i>Bonnaya brachiata</i>	Linderniaceae	LC		Native
<i>Bonnaya teniifolia</i>	Linderniaceae	NE		Native
<i>Celosia argentea</i>	Amaranthaceae	LC		Introduced
<i>Chamecrista mimosoides</i>	Caesalpiniaceae	LC		Native
<i>Chrysopogon aciculatus</i>	Poaceae	NE	Palatable; cattle	Native
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Cyperus lecocephala</i>	Cyperaceae	NE		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Cyperus substramineus</i>	Cyperaceae	NE		Native
<i>Cyperus tuberosus</i>	Cyperaceae	LC		Native
<i>Dimeria veldkampii</i>	Poaceae	NE		Native
<i>Drosera indica</i>	Droseraceae	NE		Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Eriocaulon eurypeplon</i>	Eriocaulaceae	LC		Native
<i>Eriocaulon goaense</i>	Eriocaulaceae	NE		Native
<i>Eriocaulon tuberiferum</i>	Eriocaulaceae	V		Native
<i>Euphorbia concanensis</i>	Eriocaulaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Geissaspis tenella</i>	Fabaceae	LC		Native
<i>Glyphochloa divergens</i>	Poaceae	V		Native
<i>Hedyotis corymbosa</i>	Rubiaceae	NE		Native
<i>Heteropogon contortus</i>	Poaceae	NE	Palatable; cattle	Native
<i>Impatiens balsamina</i>	Balsaminaceae	NE		Native
<i>Indigofera tinctoria</i>	Fabaceae	NE		Introduced
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Isachne gracilis</i>	Poaceae	NE		Native
<i>Ischaemum janarthanamii</i>	Poaceae	NE		Native
<i>Ischaemum manilaliana</i>	Poaceae	NE		Native
<i>Ischaemum molle</i>	Poaceae	LC		Native
<i>Kyllinga nemoralis</i>	Cyperaceae	LC		Native
<i>Lepidagathis cuspidata</i>	Acanthaceae	NE		Native
<i>Lepidagathis fasciculata</i>	Acanthaceae	NE		Native
<i>Leucas aspera</i>	Lamiaceae	NE		Native
<i>Lindernia ciliata</i>	Linderniaceae	LC		Native

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Murdannia edulis</i>	Commelinaceae	NE		Native
<i>Murdannia semiteres</i>	Commelinaceae	LC		Native
<i>Neanotis rheedei</i>	Rubiaceae	EN		Native
<i>Panicum auritum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Panicum notatum</i>	Poaceae	NE		Native
<i>Panicum psilopodium</i>	Poaceae	LC		Native
<i>Paspalum conjugatum</i>	Poaceae	LC		Native
<i>Pennisetum pedicellatum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Phyllanthus niruri</i>	Phyllanthaceae	NE		Native
<i>Polygala erioptera</i>	Polygalaceae	NE		Native
<i>Rhamphicarpa fistulosa</i>	Orobanchaceae	LC		Native
<i>Rhynchospora wightiana</i>	Cyperaceae	NE		Native
<i>Rotala indica</i>	Lythraceae	LC		Native
<i>Rungia apiculata</i>	Acanthaceae	NE		Native
<i>Smithia conferta</i>	Fabaceae	NE		Native
<i>Smithia sensitiva</i>	Fabaceae	LC		Native
<i>Tridax procumbens</i>	Asteraceae	NE		Introduced
<i>Xyris indica</i>	Xyridaceae	LC		Native

Verna

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Alysicarpus vaginalis</i>	Fabaceae	NE		Native
<i>Apluda mutica</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arundinella pumila</i>	Poaceae	NE	Palatable; cattle	Native
<i>Arundinella tuberculata</i>	Poaceae	NE		Native
<i>Bhidea burnsiana</i>	Poaceae	V		Native
<i>Bonnaya antipoda</i>	Linderniaceae	LC		Native
<i>Cajanus cajan</i>	Fabaceae	NE		Native
<i>Canscora shrirangiana</i>	Gentianaceae	CE		Native
<i>Cassia pumila</i>	Fabaceae	NE		Native
<i>Celosia argentea</i>	Amaranthaceae	LC		Introduced
<i>Cynodon dactylon</i>	Poaceae	NE	Palatable, cattle	Native
<i>Cyperus iria</i>	Cyperaceae	LC		Native
<i>Cyperus rotundus</i>	Cyperaceae	LC		Native
<i>Cyperus substramineus</i>	Cyperaceae	NE		Native
<i>Danthonidium gammie</i>	Poaceae	NE		Native
<i>Dimeria veldkampii</i>	Poaceae	NE		Native
<i>Dimeria woodrowii</i>	Poaceae	NE		Native
<i>Eragrostis unioloides</i>	Poaceae	LC	Palatable; cattle	Native
<i>Enicostema verticillatum</i>	Gentianaceae	NE		Introduced
<i>Eriocaulon eurypeplon</i>	Eriocaulaceae	LC		Native
<i>Exacum pumilum</i>	Gentianaceae	NE		Native
<i>Fimbristylis ferruginea</i>	Cyperaceae	LC		Native
<i>Fimbristylis miliacea</i>	Cyperaceae	NE		Native
<i>Fimbristylis schoenoides</i>	Cyperaceae	LC		Native
<i>Geissaspis cristata</i>	Fabaceae	LC		Native
<i>Heteropogon contortus</i>	Poaceae	NE	Palatable; cattle	Native
<i>Impatiens balsamina</i>	Balsaminaceae	NE		Native
<i>Indigofera tinctoria</i>	Fabaceae	NE		Introduced
<i>Isachne globosa</i>	Poaceae	LC	Palatable; cattle	Native
<i>Ischaemum indicum</i>	Poaceae	NE		Native
<i>Ischaemum janarthanamii</i>	Poaceae	NE		Native
<i>Ischaemum molle</i>	Poaceae	LC		Native
<i>Ischaemum semisagittata</i>	Poaceae	NE	Palatable; cattle	Native
<i>Justicia wynaudensis</i>	Acanthaceae	NE		Native
<i>Lepidagathis cuspidata</i>	Acanthaceae	NE		Native
<i>Leucas aspera</i>	Lamiaceae	NE		Native
<i>Murdania edulis</i>	Commelinaceae	NE		Native
<i>Neanotis rheedei</i>	Rubiaceae	EN		Native
<i>Neonatis foetida</i>	Rubiaceae	NE		Native
<i>Panicum auritum</i>	Poaceae	NE	Palatable; cattle	Native
<i>Pennisetum pedicellatum</i>	Poaceae	NE	Palatable; cattle	Native

Name of the species	Family	IUCN status	Palatable	Native or not
<i>Pogostemon deccanensis</i>	Lamiaceae	NE		Native
<i>Rhamphicarpa fistulosa</i>	Orobanchaceae	LC		Native
<i>Rhynchospora wightiana</i>	Cyperaceae	NE		Native
<i>Sesamum radiatum</i>	Pedaliaceae	NE		Introduced
<i>Smithia conferta</i>	Fabaceae	NE		Native
<i>Smithia sensitiva</i>	Fabaceae	LC		Native
<i>Spermacoce ocymoides</i>	Rubiaceae	NE		Native
<i>Themeda tremula</i>	Poaceae	NE	Palatable; cattle	Native
<i>Zornia gibbosa</i>	Fabaceae	NE		Native

Annexure 2: Glimpses of field work





Annexure 3: Glimpses of the grasslands

Quitol



Ravan Dongar



Surla



Pilerne



Pale



Mollem



Sosogad



Succoro



Verna

