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Effect of Different Fencing Regimes on Community Structure of Perennial Plant Species in Cholistan Desert, Pakistan

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ABSTRACT

The present study was conducted to analyze the effect of different fencing regimes on a community structure of perennial plant species in Cholistan desert. Major sites include Derawar Fort (Biodiversity Park IUB), Mauj Garh Fort (Livestock Farm) And Lal Suhanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). In each site, thirty-three quadrats measuring 10 x 10 m2 are laid out at random i-e., eleven quadrats at each sub sites (sand dune, inter dune and clayey land). During the study the parameter which we covered are density, relative density, relative frequency, cover, relative cover, importance value index and diversity index. After the completion of the study 31 families and 57 species are reported in all three sites. Ochthochloa compressa, Suaeda fruticose and Lasiurus scindicus showed very high values of relative density, relative frequency, relative cover and importance value. Cenchrus ciliaris, Cymbopogon jwarancusa followed by Haloxylon salicarnicum have moderate while Ziziphus nummularia, Salvadora oleiodes, Aristida hystricula, Calotropis procera and Heliotropium crispum have very low values of phytosociology parameters. The average of Diversity index of all species are found at all three sites was (0.8009822). Overall selected three sites play an important role in the conservation of many native species of desert that are otherwise facing multiple biotic abiotic and anthropogenic factors.

INTRODUCTION

The word "biodiversity" is now often used to refer to the variety of living organisms as well as their connections to and interactions with their surroundings (Khan *et al*., 2004; Glowka *et al*., 1994). The extinction of plant species has immediate and indirect economic repercussions since they are crucial sources of food and medicine, among other things (López-Pujol *et al*., 2006). Governments in more than 150 nations have signed an agreement for biodiversity protection, and billions of dollars have been invested on biodiversity (United Nations Environment Programmed,1992; Takacs, 1996; Sanderson and Redford., 1997; Redford *et al*., 1999). In the natural environment, plants are vulnerable to pest assaults from exotic vegetation herbivores and diseases such as viruses, fungus, and nematodes (Atkinson & Urwin, 2012). Climate change has the potential to affect the variety of habitats for bacteria and insects (SuzukI *et al*., 2014).

The desert in this area is now suffering from a lack of potable water and little rainfall (Ashraf, 2006). South of the Punjab, Cholistan in Pakistan is a desert region with 26000 km2 of scorching, dry sand (Arshad *et al*., 2009; Arshad *et al*., 2008; Arshad *et al*., 2008; Kottek *et al*., 2006; Sommer *et al*., 2011; Ahlstrom *et al*., 2015; Kottek *et al*., 2006; Sommer *et al*., 2011; Kerley *et al*., 2000; Akhter and Arshad, 2006). The Cholistan desert's extreme aridity and water scarcity are not its only main issues; extensive resource extraction also greatly damages the ecology (Elsharkawi, *et al*., 1997).

Plants are a component of the natural environment of our globe, however there aren't any plant species that can be found everywhere since each species is bred for a certain set of traits, including a set of unique environmental circumstances. These species, which share a genetic composition, aid in the emergence of related plants and, to a significant degree, play a role in the construction of important earth biomes (Perez and Frangi., 2000; Rafay *et al*., 2015). Xeromorphic species, which make up the vegetation, are prone to change in response to environmental pressures, particularly extreme dryness, high salt content, high temperatures, and low temperatures, as well as nutrient availability (Naz *et al*., 2010). In comparison to the southern region (the drier region), which has less than 100 mm of annual rainfall, the east side of the desert experiences relatively high rainfall, up to 200 mm per year, and has very dense crop coverage (Arshad *et al*., 2003; Noureen *et al*., 2008; Hameed *et al*., 2011).

Numerous studies have been conducted on the composition and organization of plant communities. For instance, *Haloxylon stocksii, Prosopis cineraria, Ochthochloa compressa, Tribulus terrestris* (more appropriately *T. longipetalus), Dipterygium glaucum* and *Calligonum polygonoides. were* among the prominent species that used to identify as the Cholistan Desert has six primary plant diversity (Khan, 1992). categorized plants based on adaptability and categorized *Cenchrus ciliaris* and *Panicum turgidum* (Arshad and Rao, 1995). The *Calligonum polygonoides* community, or the sandy plains of the C community, dominated the sand dunes. The communities of salt marshes are *Haloxylon stocksii-Suaeda fruticosa-Tamarix dioica*, while the soil is formed of C. *polygonoides-Prosopis cineraria-Capparis* decidua (Hameed *et al.*, 2011). Numerous grasses that can withstand stress are present nearby, including *Panicum antidotale, Cymbopogon jwarancusa, Cenchrus ciliaris, Sporobolus ioclados, Aeluropus lagopoides, Lasiurus scindicus Ochthochloa compressa, Stipagrostis plumosa, Cyperus rotundus* and *Cyperus conglomerates* (Jamil *et al*., 2013).

The Cholistan Desert is naturally separated into three separate sections: Tall salt flats, inter-dune flats, as well as sand dunes all have distinctive plant structures. *Aristida adscensionis, Cenchrus ciliaris* and *Panicum turgidum* and inter-dune flats are outstanding examples of sand dune vegetation C. *ciliaris, C. biflorus, Lasiurus scindicus, Ochthochloa compressa* and *Stipagrostis plumosus*, and of saline flats *Aeluropus lagopoides, L. scindicus, Sporobolus ioclados, O. compressa and Cymbopogon jwarancusa* (Naz *et al*., 2010). *Aeluropus lagopoides, Aristida adscensionis, Cenchrus biflorus, Cenchrus pennesetiformis, Cymbopogon jwarancusa, Lasiurus scindicus, Panicum antidotale*, and *Panicum turgidum* were the most prevalent grass species in greater Cholistan. *Panicum antidotale*, and *Panicum turgidum* are among the plants of lasser cholistan. The absence of high quality water is the area's major issue, just as it is in other deserts. Most of Cholistan has groundwater is saline, making it unsuitable for typical plant development. It is quite probable that a significant portion of Cholistan might be commercially exploited by using a biological strategy (Ashraf *et al.*, 2008).

The desert vegetation of Cholistan experiences several environmental stresses. a protracted drought, scorching summer temperatures, little humidity, and rapid evaporation (Jamil *et al.*, 2013). The main result of the feeding seems to be a reduction in the number of different animal species that inhabit the habitats and small pastures. The dominant plant species at the third location (a non-vegetated region) include *Cenchrus ciliaris* and *Cymbopogon jwarancusa* followed by *Calligonum polygonoides* (Khan *et al*., 2004).

The focus on the various dominant species in the communities is brought out by numerical data. A specific analytical characteristic, such as frequency, density, or abundance of animal species in communal settings, is expressed in abundance to determine their dominance (Mahajan *et al.*, 2017). Estimates from small samples, known as quadrats, are typically used to determine the scale of various plant structures. Quadrat point analysis entails shifting the point to a certain area utilizing plants and the presence of recording or absence of the desired parameter (Heslehursl *et al*., 1971). Using phytosociological formulas, the relative density, absolute frequency, and lateral coverage of each plant type were taken into consideration (Iqbal *et al*., 2018, Anwar *et al*., 2019, Kamran *et al*., 2020). With the assistance of the Flora of Pakistan and other published material, all specimens of gathered plants were identified (Arshad & Rao, 1994).

In the early scientific literature, there are unquestionably certain metrics that may be used to assess the spatial integration of animal species (Clark & Evans, 1954). However, the majority of these were established at the level of a single species, and many were determined using biodiversity data based on quadrats (Lloyd, 1967). According to sample distances between nearby subjects, metrics are determined (Chen *et al*., 2019). The preservation and development of resources for plants and other living things in their native habitats is referred to as In-situ conversation**.** Conservation areas or other protected areas that permit natural processes to proceed unhindered should be nominated in order to guarantee that you are a wild representative endangered plant species are preserved (Cunningham, 1997). The identification of the environment by various kinds of medicinal plants is crucial since it is only natural that plant variety is genetic, species, and ecological standards that can be maintained for a very long time (Okigbo *et al*., 2008).Two of the biggest issues facing conservation planners are examining biodiversity and conservation utilizing in situ conservation methods (Witting and

Loeschcke, 1995). The need to create conservation plans is increasing rapidly as threats to biodiversity become more severe. Limiting human involvement and the influence of predators are two key ways that fencing may help preserve biodiversity in large-scale systems (Hayward and Kerley, 2009).

The indirect effects of fencing on the local flora have mostly gone unnoticed. In the current situation, we hypothesized that fencing practices would be advantageous for both the preservation of priceless plant species. The goal of the current research was to assess the advantages of protected habitat for vulnerable native vegetation at a chosen location. The main objectives of the present study is to evaluate the phytosociology of the selected fenced areas of Cholistan desert; analyze the edaphic factor affecting on phytosociology of selected sites of Cholistan desert; To investigate how far the fenced areas conserved the biodiversity of Cholistan; To record the floristic inventory of selected fenced areas of cholistan desert.

MATERIALS AND METHODS

Geographical Location of Cholistan

South of Punjab, Pakistan, in the Cholistan Desert, the research was carried out. The Thar Desert in Sindh, Pakistan, and the Rajastan Desert in India are all a component of the immense desert that makes up India. With latitudes It spans approximately 2.6 million hectares and has been located between 27° 42′ and 29° 45′ N and 69° 52′ and 75° 24′ E (Arshad *et al*., 2008). The desert's width ranges from 32 to 192 km during a 480 km time interval (Chaudhry, 1992). The topography, vegetation, and soil of this desert, which was established on parent material, may be split into two geomorphologic parts; the southern section, Greater Cholistan, has an area of 18,130 km2, whereas the northern section, Lesser Cholistan, covers a smaller area is close to the canal area and measures about 7,770 km^2 (Akbar *et al*., 1996).

Study Site

The study site is divided in to three study sites i.e. Derawar Fort (Biodiversity park IUB), Mauj Garh Fort (Livestock farm) and Lal Suhanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). Where the study has been carried out for the year 2021 and 2022. Fall season was November to December and the spring season of collection data was February to March.For extensive and maximum vegetation study which we further subdivided in sub sites that are sand dune, inter dune and clayey land. At every sub site 11 quadrats were placed and which are collectively 33 quadrats at every sites, during the study the parameter which we covered are density, relative density, relative frequency, cover, relative cover, importance value index, abundance and diversity index the three sites mentioned are shown in the map of desert of chloistan Pakistan.

Table 1

Sr. No.	Sites	GPS Location	Elevation	Sub Site
1	Mauj Garh Fort (Livestock farm)	N: 29.01.459′ E: 72.08.322′	391 ft	Sand dune Inter dune Clayey patch
2	**Derawar Fort** (Biodiversity park IUB)	**N**: 28.46.674′ **E**: 71.19.483′	325 ft	Sand dune Inter dune Clayey patch
	Lal Suhanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)	**N**: 29.15.915′ **E:** 72.04.356′	373 ft	Sand dune Inter dune Clayey patch

Table 2

Lay out of phytosociology study for Fall season 2021 of the three sites (Mauj Garh Fort, Derawar Fort and Lal Suhanra National Park). With sub sites Sand dune, Inter dune and Clayey land.

Fall Season 2021									
Sr. No.	**Site 01**			**Site 02**			**Site 03**		
Sites	**Mauj Garh Fort** (Livestock farm)			**Derawar Fort** (Biodiversity park IUB)			**Lal Suhanra National Park** (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)		
Sub sites	Sand dune	Inter dune	Clayey land	Sand dune	Inter dune	Clayey land	Sand dune	Inter dune	Clayey land
GPS Location	**N**:2901.459′ **E**:7208.322′	**N**:2901.425′ **E**:7208.359′	**N**:2901.466′ **E**:7208.284′	**N**:2846.674′ **E**:7119.483′	**N**:2846.790′ **E**:7119.551′	**N**:2846.699′ **E**:7119.526′	**N**:2915.936′ **E**:7204.356′	**N**:2917.412′ **E**:7202.562′	**N**:2916.142′ **E**:7203.556′
Elevation	391 ft	395 ft	315 ft	325 ft	331 ft	306 ft	373 ft	394 ft	401 ft

Table 3

Lay out of phytosociology study for Spring season 2022 of the three sites (Mauj Garh Fort, Derawar Fort and Lal Suhanra National Park). With sub sites Sand dune, Inter dune and Clayey land.

Spring Season 2022			
Sr. No.	**Site 01**	**Site 02**	**Site 03**
Sites	**Mauj Garh Fort** (Livestock farm)	**Derawar Fort** (Biodiversity park IUB)	**Lal Suhanra National Park**

							(Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)		
Sub sites	Sand dune	Inter dune	Clayey land	Sand dune	Inter dune	Clayey land	Sand dune	Inter dune	Clayey land
GPS	**N**:2901.459′	**N**:2901.425′	**N**:2901.466′	**N**:2846.704′	**N**:2846.779′	**N**:2846.94′	**N**:2915.936′	**N**:2917.412′	**N**:2916.137′
Location	**E**:7208.322′	**E**:7208.359′	**E**:7208.284′	**E**:7119.535′	**E**:7119.617′	**E**:7119.604′	**E**:7204.356′	**E**:7202.562′	**E**:7203.530′
Elevation	391 ft	395 ft	315 ft	326 ft	313 ft	313 ft	373 ft	394 ft	396 ft

Phytosociological Study

Survey, Sampling, Identification and Data Analysis

For the study the effect of different fencing regimes on a community structure of perennial plant species in Cholistan, various locations viz., three major sites. Quadrats method was utilized to analyses the vegetation quantitatively in each site. Each location received thirty-three 10 × 10 m^2 quadrats, which were distributed at random and the sub site divided in three sub sites (sand dune, inter dune and clayey land). The identified The National Herbarium of Pakistan, NARC Islamabad, as well Cholistan Institute of Desert Studies at Islamia University Bahawalpur have matching species that identified.

Phytosociological Attributes

A thorough investigation of the phytosociological qualities is thought to be necessary plants (Hussain, 2009) In each quadrat, plant density, frequency and cover were recorded for that all used quadrats techniques. Importance value index of each plant species was calculated the ensuing variables are computed (Hussain, 2009).

A. Frequency

Typically, it is the proportion of quadrats where a certain species was found. It was as determined by the following formula a (Mahajan *et al*., 2017).

$$\text{Frequency} = \frac{Number\ of\ quadrats\ in\ which\ species\ occurs}{Total\ number\ of\ quadrats} \times 100$$

B. Density

The quantity of plants of each species in a given area is known as density. It was using the following formula to calculate (Mahajan *et al*., 2017).

$$\text{Density} = \frac{Number\ of\ plants\ of\ a\ certain\ species}{Total\ area\ sampled} \times 100$$

C. Cover

The cover is a portion of all the places that the species uses. using the following formula to calculate

$$\text{Cover} = \frac{Total\ area\ covered\ by\ a\ species}{Total\ area\ sampled} \times 100$$

Importance Value

Each of the three variables—relative coverage, relative density, and relative frequency—defines a distinct aspect of the significance of a certain type in society. Consequently, the combination of related variables provides a reliable indicator of the significance of biodiversity. The significance value is the amount in question.

A. Relative Density

According to (Mahajan *et al*., 2017) An analysis for relative density as called of the arithmetic strong point of each kind proportion of overall population to all species to the animals.

$$\text{Relative density} = \frac{Number\ of\ individual\ of\ the\ species}{Number\ of\ individual\ of\ all\ the\ species} \times 100$$

B. Relative Frequency

The degree of each species' dispersion throughout the region in proportion to the total number of species that were present (Mahajan *et al*., 2017).

$$\text{Relative frequency} = \frac{Number\ of\ occurrence\ of\ the\ species}{Number\ of\ occurrence\ of\ all\ the\ species} \times 100$$

C. Relative Cover

The cover is based on the total cost of a certain kind in proportion to the quantity of other animal species in the vicinity that they have installed.

$$\text{Relative cover} = \frac{Total\ basal\ area\ of\ the\ species}{Total\ basal\ area\ of\ all\ the\ species} \times 100$$

According to techniques outlined by Curtis and McIntosh (1951) and Stephenson, a method is designed to assess the significance of an organism. Importance value is equal to the product of relative density, frequency, and cover.

Importance Value Index (IVI)

The formula used by other researchers to calculate the species of trees, shrubs, and herbs is VI = RD + RF + RCo (Relative cover). Because it takes time and is uncertain to calculate the base area of plant species even at a 1 * 1 m structure.

$$IVI = RD + RDo + FR$$

OR

$$IVI = \frac{(RD + FR)}{2}$$

RD= Relative density

- RDo= Relative dominance
- FR= Frequency relative

Simpson's Diversity Index

To calculate the Simpson's Diversity Index is a measure of variety that considers both the total number of species and their relative abundance. Diversity grows along with species diversity and equality. n is the overall population size for a given species.

$$D = 1 - \frac{\varepsilon n(n-1)}{N(N-1)}$$

Where:

- n = number of individuals of each species

- N = total number of individuals of all species

Soil Analysis

Soil Sampling

At each location, a 1 kg soil sample was taken from a depth of 0 to 30 cm. At each site, soil samples are taken. In the soil study area, collected samples are kept in specific polythene bags that are labeled for physical and chemical analysis (Jackson, 1967) The Bouyoucos Hydrometer System was used to evaluate the soil's texture (Sarir *et al*., 2006) the texture triangle was then used to calculate the text phase Unless otherwise noted, the procedures of Hand Book No. 60 (Salinity Lab. Staff, 1954) are used to conclude soil analyses. Following is a basic explanation of the analytical techniques (Adam & Aliyu, 2019).

Preparation of Saturated Soil Paste

The saturated soil paste was created by taking 250 g of soil from a plastic beaker, adding a little more distilled water, and mixing with a spatula until there was no freer water in the paste area. The saturated soil paste extract was then obtained by pressing with the aid of a filter. To gradually reduce salt consumption, 25 mL of sodium solution hex metaphosphate (1%) was added to the single drop. Storage (Richards, 1954).

Saturation Percentage (SP)

A tiny amount of the moist soil paste is removed from a tray of china. Then, after being dried to a constant weight of 105 °C, it was weighed once again. Method 27a is used to compute the percentage of saturation in the area, as given in the formula.

$$\text{Saturation percentage} = \frac{Mass\ of\ wet\ soil - Mass\ of\ oven\ dry\ soil}{Mass\ of\ oven\ dry\ soil} \times 100$$

Soil Ph. and Electrical Conductivity (EC)

The saturated soil paste that was made previously in 3.2.4.2 and solidified overnight was used to measure the pH of the soil (Kent Eil 7015). (Method 21a). The Jenway digital conductivity model 4510 measured electrical conductivity (Method 3a and 4b).

Organic Matter and Soil Moisture

The soil sample (1g) was carefully combined with 20 mL of saturated sulfuric acid and a 10 mL solution of 1N potassium dichromate. Following this, 25 mL of a 0.5 N ferrous sulfate solution was added to 150 mL of clean water, and the surplus was combined in a pink region with a solution of 0.1 N potassium permanganate. The average humidity in soil samples is now determined using a Scale Tec Moisture Analyzer at 110 centigrade (Moodie *et al*., 1959).

Available Phosphorus, Sodium and Potassium

According to this method used by Page *et al*., 2.50 g of soil was taken and added to a 0.50 M solution of NaHCOR3R in step to a pH of 8.5 (with the aid of 50% w/w NaOH) (1982). The Sodium and Potassium levels were measured using a flame photometer (Jenway PFP7) (Rhoades, 1982).

Table 4

The Parameter of Soil Sample during phytosociology study for Fall and Spring season 2021-2022 of the three sites (Mauj Garh Fort, Derawar Fort and Lal Suhanra National Park). With sub sites Sand dune, Inter dune and Clayey land.

S. No	Sites	Sub sites	Sample no.	EC mS cm^2	Ph	Organic Matter (%)	Available Phosphorus (mg kg^{-1})	Available Potassium (mg kg^{-1})	Saturation Percentage (%)
1	**Biodiversity**	Sand dune	2820	1.7	8.9	0.49	3.10	229	34
2	-	Inter dune	2821	4.1	8.0	-	-	220	34
3	-	Clayey land	2822	10	8.2	0.63	2.0	212	36
4	**SZCBC**	Sand dune	2824	1.2	8.0	0.77	3.94	462	32
5	-	Inter dune	2825	0.8	8.1	-	-	360	30
6	-	Clayey land	2826	3.2	8.0	0.76	3.48	246	30
7	**Mauj Garh**	Sand dune	2828	1.2	8.0	0.49	3.65	229	32
8	-	Inter dune	2829	1.2	8.0	-	-	225	30
9	-	Clayey land	2830	0.82	8.0	0.42	3.84	220	32

Anthropogenic Factors

Anthropogenic Factors are the physcialy analaysis during the phytosociology study for Fall and Spring season 2021-2022 of the three sites Derawar Fort (Biodiversity park IUB). Mauj Garh Fort (Livestock farm). Lal Suhanra National Park (Sheikh Mohammed

Bin Zayed Al-Nahyan Conservation and Breeding Center). With sub sites Sand dune, Inter dune and Clayey land.

Table 5

Anthropogenic Factors during phytosociology study for Fall and Spring season 2021-2022 of the site Mauj Garh Fort (Livestock farm). With sub sites Sand dune, Inter dune and Clayey land.

S. No.	Anthropogenic Factors	Nil	Low	Medium	High
1	Agricultural Practices				
2	Deforestation				
3	Construction site				
4	Military practices				
5	Invasive species				
6	Over exploitation of medicinal plants				
7	Over grazing				
8	Urbanization				
9	Pollution				
10	Overhunting				
11	Tourism				
12	Plastic waste				
13	Archeological Activities				

Table 6

Anthropogenic Factors during phytosociology study for Fall and Spring season 2021-2022 of the site Derawar Fort (Biodiversity park IUB). With sub sites Sand dune, Inter dune and Clayey land.

S. No.	Anthropogenic Factors	Nil	Low	Medium	High
1	Agricultural Practices				
2	Deforestation				
3	Construction site				
4	Military practices				
5	Invasive species				
6	Over exploitation of medicinal plants				
7	Over grazing				
8	Urbanization				
9	Pollution				
10	Overhunting				
11	Tourism				
12	Plastic waste				
13	Archeological Activities				

Table 7

Anthropogenic Factors during phytosociology study for Fall and Spring season 2021-2022 of the site Lal Suhanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). With sub sites Sand dune, Inter dune and Clayey land.

S. No.	Anthropogenic Factors	Nil	Low	Medium	High
1	Agricultural Practices				
2	Deforestation				
3	Construction site				
4	Military practices				
5	Invasive species				
6	Over exploitation of medicinal plants				
7	Over grazing				
8	Urbanization				
9	Pollution				
10	Overhunting				
11	Tourism				
12	Plastic waste				
13	Archeological Activities				

GPS Data

With the use of a portable GPS meter, GPS values including altitude, latitude, and longitude were taken at each research location (Garnaier).

Statistical Analysis

Simple averages, percentages, and mean values are obtained using the Microsoft Excel spreadsheet analysis technique (MS OFICE, 2010), which is also used to produce the necessary tables and Figures (McCullough & Heiser, 2008).

RESULT

Fall Season 01 (November to December)

In the fall season 01 we have studied three sites for collection data i.e. Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayden Al-Nahyan Conservation and Breeding Center) and Moj Garh Fort (Livestock farm) which have sub sites as given sand dune, inter dune and clayey land. At every sub site 11 quadrats were placed and which are collectively 33 quadrats at every sites, during the study. After the completion of the study 23 families are reported in all three sites. These families cover the 41 species of plants (Table no. 8) shown the collection of families and species during fall season 2021. During the study the parameter which we covered are density, relative density, relative frequency, cover, relative cover, importance value index, and abundance and diversity index the three sites are mentioned.

While in both season fall and spring during consective years (2021 - 2022) we have studied three sites for collection data i.e. Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayden Al-Nahyan Conservation and Breeding Center) and Moj Garh Fort (Livestock farm) which have sub sites as given sand dune, inter dune and clayey land. At every sub site 11 quadrats were placed and which are collectively 33 quadrats at every sites, during the study. After the completion of the study 31 families are reported in all three sites. These families cover the 57 species of plants (Table no. 9) shown the collection of families and species during both season fall and spring 2021-2022.

Table 8

All the families and species of quadrats of study recorded at all three sites Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayden Al-Nahyan Conservation and Breeding Center) and Moj Garh Fort (Livestock farm). And sub sites during Fall saeson 2021.

S. No.	Family	Scientific name
1	Amaranthanceae	*Haloxylon recurvum* *Chenopodium album* *Haloxylon salicarnicum* *Salsola bryosma* *Suaeda fruticosa* *Salsola imbricate*
2	Apocynaceae	*Calotropis procera*
3	Apocynaceae	*Leptadenia pyrotechnica* *Gisekia pharmaceoides*
4	Asphodelaceae	*Asphodelus tenuifolius*
5	Asteraceae	*Launaea nudicaulis* *Launaea residifolia* *Silybum marianum*
6	Boraginaceae	*Heliotropium crispum*
7	Caparaceae	*Capparis decidua*
8	Capparidaceae	*Diptrigium gluacum*
9	Cruciferae	*Farsetia hamiltonii*
10	Cyperaceae	*Cyperus rotundus*
11	Fabaceae	*Acacia nilotica,* *Prosopis cineraria*
12	Gramineae	*Sporobolus iocladus*
13	Malvaceae	*Abutilon hirtum*
14	miil	*Aristida faniculata*
15	Mimosaceae	*Acacia jacquemontii*
16	Molluginaceae	*Mollugo cerviana*
17	Nitrarianceae	*Molluginaceae*
18	Poaceae	*Cenchrus biflorus* *Cenchrus ciliaris* *Cymbopogon jwarancusa* *Cynodon dactylon* *Lasiurus scindicus* *Ochthochloa compressa* *Panicum antidotale* *Eragrostis nigra*
19	Polygonaceae	*Calligonum polygonoides*
20	Rhamnaceae	*Ziziphus mauritiana*
21	Salvadoraceae	*Salvadora oleiodes*
22	Tamaricaceae	*Tamarix aphylla* *Tamarix dioica*
23	Zygophyllaceae	*Tribulus longipetalus*

Table 9

All the families and species of quadrats of study recorded at all three sites Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayden Al-Nahyan Conservation and Breeding Center) and Moj Garh Fort (Livestock farm). And sub sites during both season fall 2021 and spring Season 2022.

S. No.	Family	Scientific name
1	Amaranthanceae	*Aerva javanica* *Haloxylon recurvum* *Chenopodium album* *Haloxylon salicarnicum* *Salsola bryosma* *Suaeda fruticosa* *Salsola imbricate*
2	Apocynaceae	*Calotropis procera*
3	Apocynaceae	*Leptadenia pyrotechnica* *Gisekia pharmaceoides*
4	Asphodelaceae	*Asphodelus tenuifolius*
5	Asteraceae	*Launaea nudicaulis* *Launaea residifolia* *Silybum marianum*
6	Boraginaceae	*Heliotropium crispum*
7	Brassicaceae	*Brassica campestris* *Farsetia hamiltonii*
8	Campanulaceae	*Indigofera argentea*
9	Caparaceae	*Capparis decidua*
10	Capparidaceae	*Diptrigium gluacum*
11	*Carotalaria bhuria*	*Papilionaceae*
12	Convolvulaceae	*Convolvulus prostrates*
13	Cruciferae	*Farsetia hamiltonii*
14	Cucurbitaceae	*Citrullus colocynthis*
15	Cyperaceae	*Cyperus rotundus*
16	Fabaceae	*Acacia nilotica,* *Prosopis cineraria* *Prosopis juliflora* *Spergula arvensis*
17	Gramineae	*Sporobolus iocladus*
18	Malvaceae	*Abutilon hirtum*
19	miil	*Aristida faniculata*
20	Mimosaceae	*Acacia jacquemontii*
21	Molluginaceae	*Glinus lotoides*
22	Molluginaceae	*Mollugo cerviana*
23	Neuradaceae	*Neurada procumbens*
24	Nitrarianceae	*Molluginaceae*
25	Poaceae	*Aristida hystricula* *Cenchrus biflorus* *Cenchrus ciliaris* *Cymbopogon jwarancusa* *Cynodon dactylon* *Lasiurus scindicus* *Ochthochloa compressa* *Panicum antidotale* *Eragrostis nigra*
26	Polygonaceae	*Calligonum polygonoides*
27	Rhamnaceae	*Ziziphus mauritiana* *Ziziphus nummularia*
28	Salvadoraceae	*Salvadora oleiodes*
29	Solanaceae	*Withania coagulans*
30	Tamaricaceae	*Tamarix aphylla* *Tamarix dioica*
31	Zygophyllaceae	*Fagonia cretica* *Tribulus longipetalus* *Tribulus terrestris*

Derawar Fort (Biodiversity park IUB)

The biodiversity park IUB that we have studied has three sub sites sand dune, inter dune and clayey land.

Site 01 (Biodiversity Park) and sub site 01 sand dunes

Ochthochloa compressa is very high relative density, *Lasiurus scindicus* has moderate while *Prosopis cineraria, Salvadora oleiodes* have very low relative density (Figure 1) *Calligonum polygonoides, Cenchrus ciliaris, Ochthochloa compressa* is very high relative frequency. *Chenopodium album* have moderate while *Salsola bryosma* have very low relative frequency (Figure 2).

Ochthochloa compressa has very high relative cover. *Tamarix dioica, Calligonum polygonoides* have moderate, while *Chenopodium album* has very low relative cover (Figure 3). *Ochthochloa compressa* has

very high IVI. *Lasiurus scindicus, Calligonum polygonoides* have moderate, while *Chenopodium album* has very low IVI. (Figure 4). Diversity index of species found at Biodiversity park sand dunes 01 i.e. (0.850964).

Figure 1

Relative Density of Sand Dune (SD) In Biodiversity Park (Derawar) In Fall Season 2021

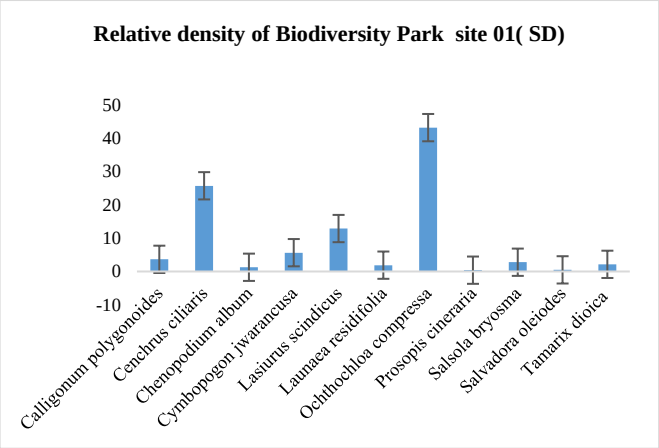


Figure 2

Relative Frequency of Sand Dune (SD) In Biodiversity Park (Derawar) In Fall Season 2021

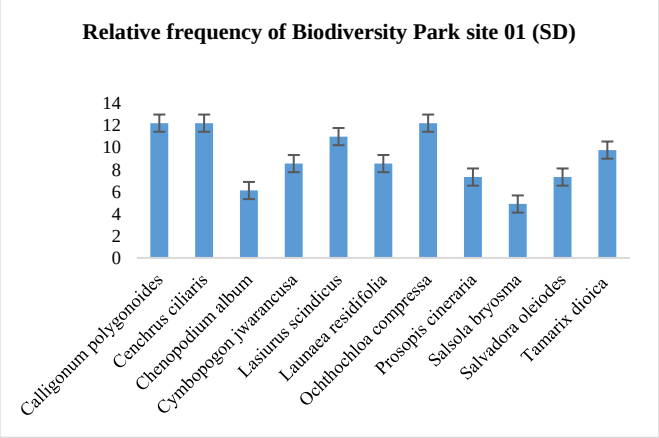


Figure 3

Relative Cover of Sand Dune (SD) In Biodiversity Park (Derawar) In Fall Season 2021

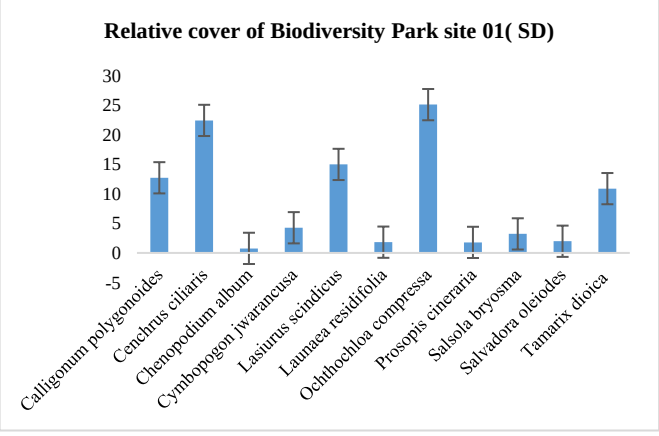
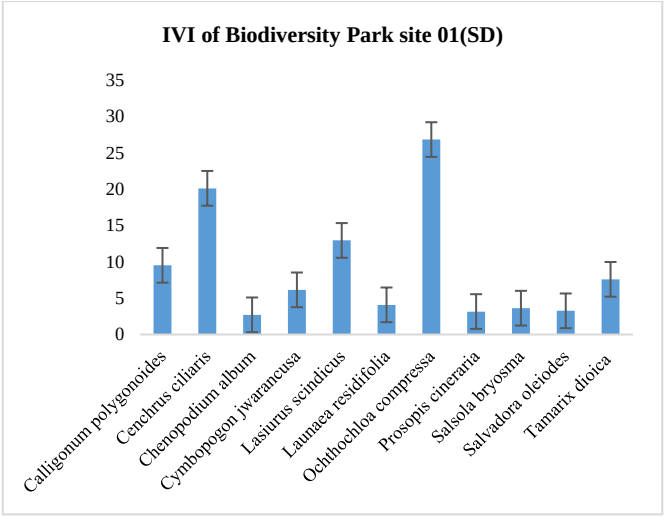


Figure 4

IVI of Sand Dune (SD) In Biodiversity Park (Derawar) In Fall Season 2021



Site 01 (Biodiversity Park) and sub site 02 inter dune

Tamarix aphylla has very high relative density. *Salsola bryosma* has moderate while *Cymbopogon jwarancusa, Lasiurus scindicus, Launaea nudicaulis* have very low relative density (Figure 5) *Asphodelus tenuifolius, Lasiurus scindicus, Salsola bryosma* have very high relative frequency, *Tamarix aphylla* has moderate while *Suaeda fruticosa* has very low relative frequency (Figure 6).

Cenchrus ciliaris has very high relative cover, *Asphodelus tenuifolius* has moderate while *Salsola imbricate, Suaeda fruticosa* have very low relative cover (Figure 7). *Tamarix aphylla* has very high IVI *Salsola bryosma, Suaeda fruticosa,* have moderate while *Launaea nudicaulis* has very low IVI (Figure 8). Diversity index of species found at Biodiversity park inter dune 01 i.e. (0.772363).

Figure 5

Relative Density of Inter Dune (ID) In Biodiversity Park (Derawar) In Fall Season 2021

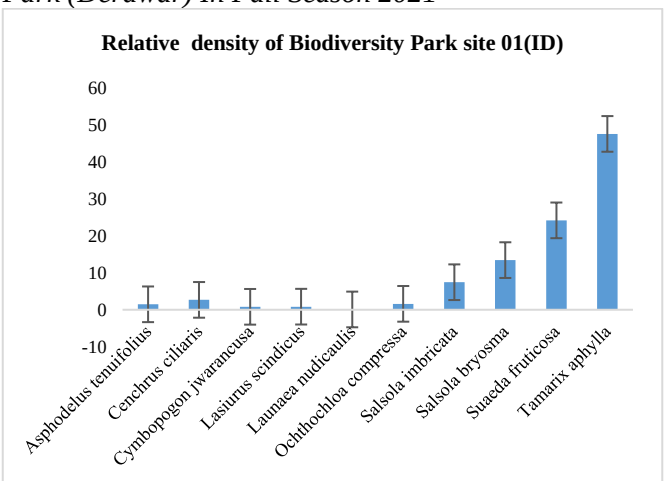


Figure 6

Relative Frequency of Inter Dune (ID) In Biodiversity Park (Derawar) In Fall Season 2021

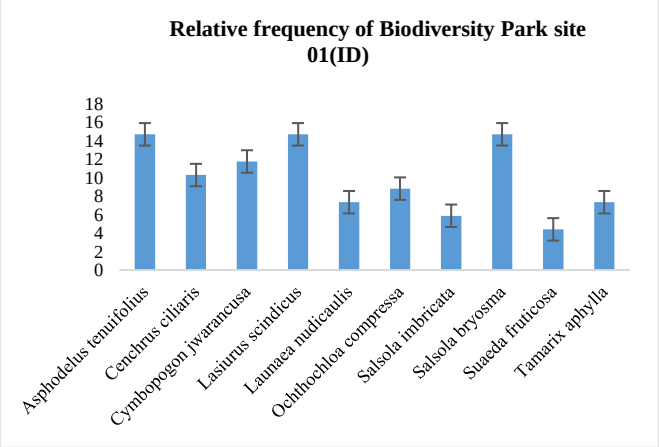


Figure 7

Relative Cover of Inter Dune (ID) In Biodiversity Park (Derawar) In Fall Season 2021

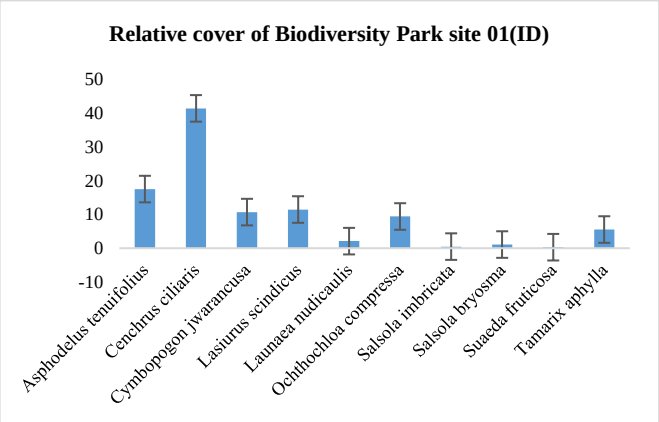
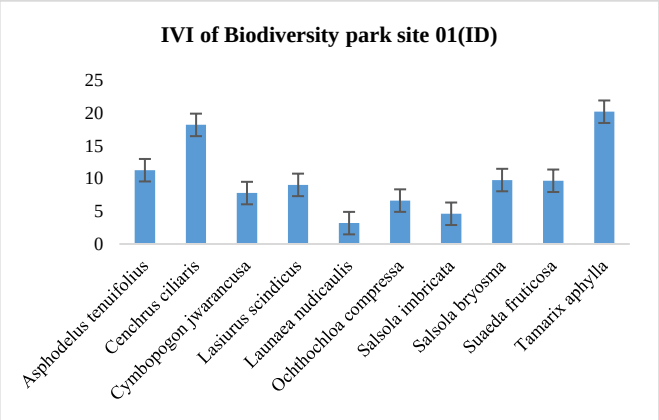


Figure 8

IVI of Inter Dune (ID) In Biodiversity Park (Derawar) In Fall Season 2021



Site 01 of (Biodiversity Park) and sub site 03 clayey land

Ochthochloa compressa, Lasiurus scindicus have very high relative density. *Cenchrus ciliaris, Cymbopogon jwarancusa* have moderate while *Acacia nilotica, Launaea residifolia* have very low relative density (Figure 9) *Suaeda fruticosa* has very high relative frequency. *Cenchrus ciliaris, Launaea residifolia* have moderate while *Lasiurus scindicus* has very low relative frequency. (Figure 10)

Suaeda fruticosa has very high relative cover. *Cenchrus ciliaris, Launaea residifolia* have moderate while *Lasiurus scindicus* has very low relative cover (Figure 11) *Ochthochloa compressa* has very high IVI. *Suaeda fruticosa* has moderate while *Acacia nilotica, Salsola imbricat, Launaea residifolia* have very low IVI. (Figure 12) Diversity index of species found at Biodiversity park clayey land i.e. (0.806539).

Figure 9

Relative Density of Clayey land (CL) In Biodiversity Park (Derawar) In Fall Season 2021

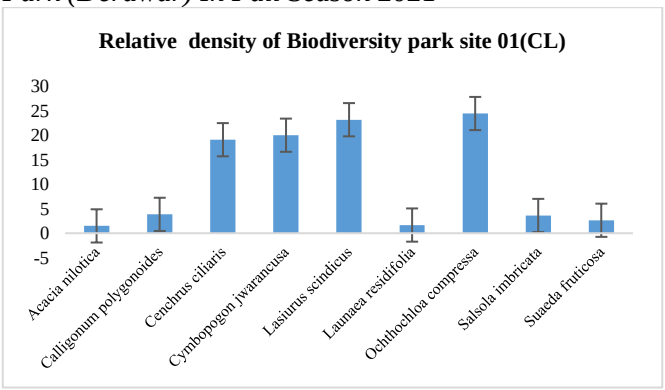


Figure 10

Relative Frequency of Clayey land (CL) In Biodiversity Park (Derawar) In Fall Season 2021

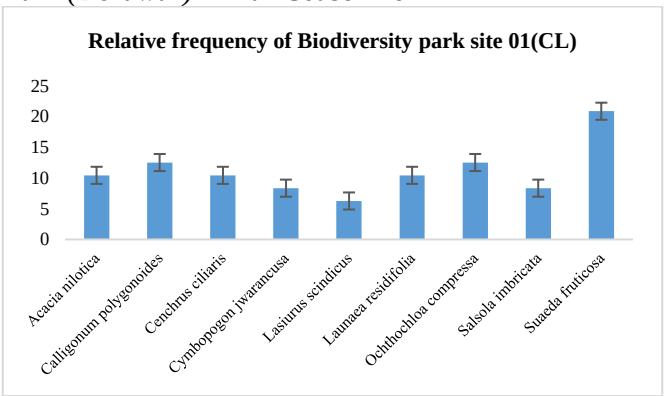


Figure 11

Relative Cover of Clayey land (CL) In Biodiversity Park (Derawar) In Fall Season 2021

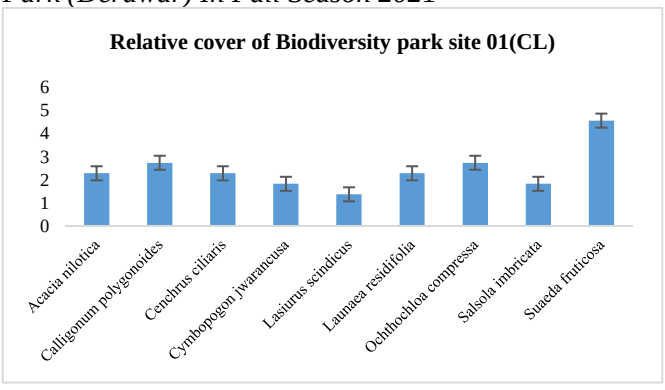
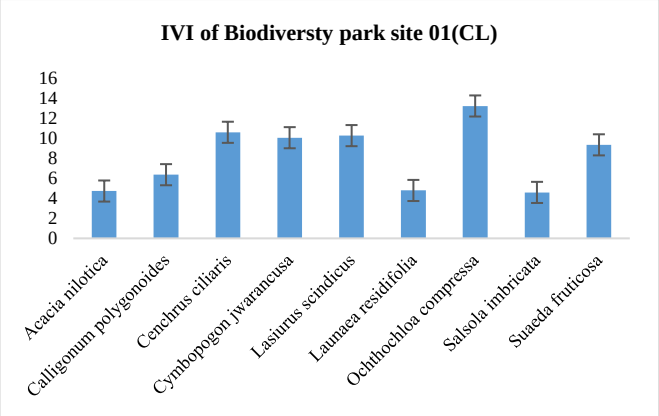


Figure 12
IVI of Clayey land (CL) In Biodiversity Park (Derawar) In Fall Season 2021



Mauj Garh Fort (Livestock farm)
The site 02 has three sub sites i.e. sand dune, inter dune and clayey land.

Site 2(Mauj Garh Fort) and sub site 01 sand dune
Cenchrus ciliaris, *Ochthochloa compressa* have very high relative *density*. *Heliotropium crispum* has moderate while *Calotropis procera, Ziziphus mauritiana and Indigofera argentea* have very low relative density (Figure 13) *Heliotropium crispum* has very high relative frequency. *Capparis decidua, Diptrigium gluacum* have moderate while *Ochthochloa compressa, Sporobolus iocladus and Indigofera argentea* have very low relative frequencies (Figure 14)

Ochthochloa compressa has very high relative cover. *Capparis decidua and Heliotropium crispum* have moderate while *Indigofera argentea, Calotropis procera* have very low relative cover. (Figure 15) *Cenchrus ciliaris*, *Ochthochloa compressa* have very high IVI, *Heliotropium crispum* has moderate while *Indigofera argentea, Calotropis procera* have very Low IVI. (Figure 16) Diversity index of Mauj Garh Fort species found at sand dunes i.e. (0.689986).

Figure 13
Relative Density of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Fall Season 2021

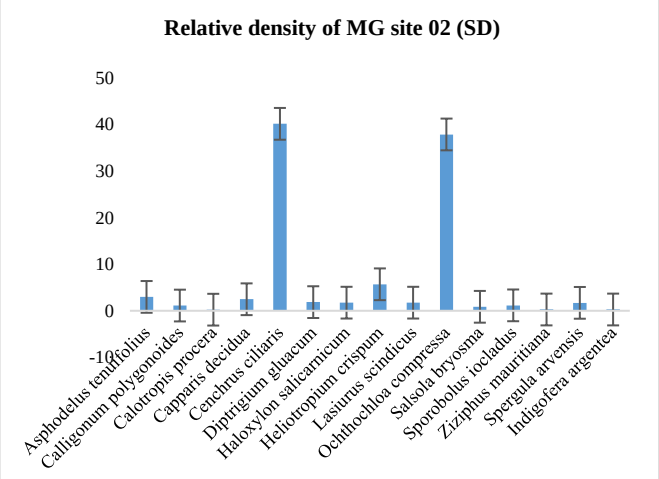


Figure 14
Relative Frequency of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Fall Season 2021

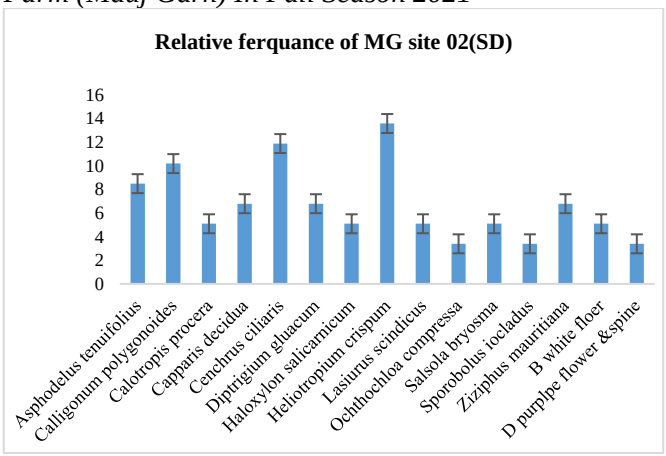


Figure 15
Relative Cover of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Fall Season 2021

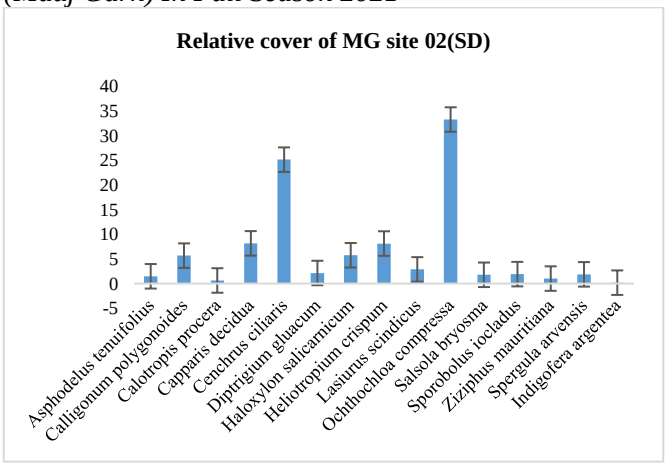
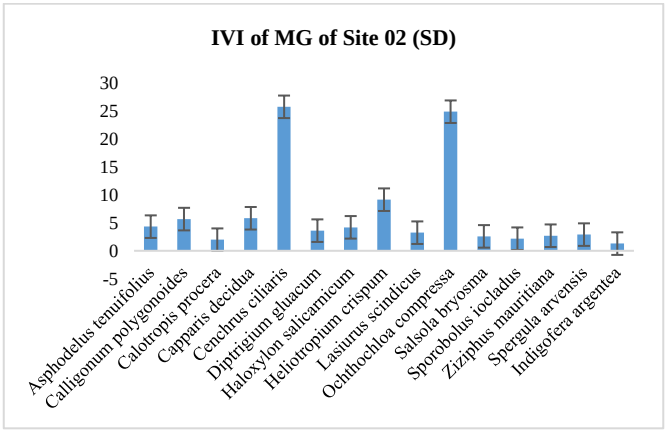


Figure 16
IVI of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Fall Season 2021



Site 02 (Mauj Garh Fort) and sub site 02 Inter dune
Cenchrus ciliaris, Lasiurus scindicus have very high relative density. *Ochthochloa compressa* has moderate while *Ziziphus nummularia, Acacia jacquemontii*, have very low relative density (Figure 17) *Cenchrus ciliaris* has very high relative frequency. *Lasiurus scindicus* has

moderate while *Haloxylon recurvum, Gisekia pharmaceoide* very low relative frequency (Figure 18)

Cenchrus ciliaris has very high relative cover. *Ochthochloa compressa* has moderate while *Haloxylon recurvum, Gisekia pharmaceoide* have very low relative cover. (Figure 19*) Cenchrus ciliaris* has very high IVI. *Ochthochloa compressa* has moderate while *Gisekia pharmaceoide, Haloxylon recurvum* have very low IVI (Figure 20) Diversity index of Mauj Garh Fort species found at inter dunes i.e. (0.716662).

Figure 17
Relative Density of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Fall Season 2021

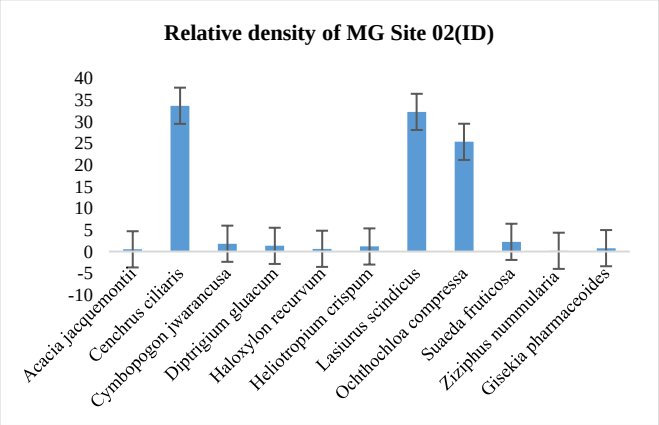


Figure 18
Relative Frequency of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Fall Season 2021

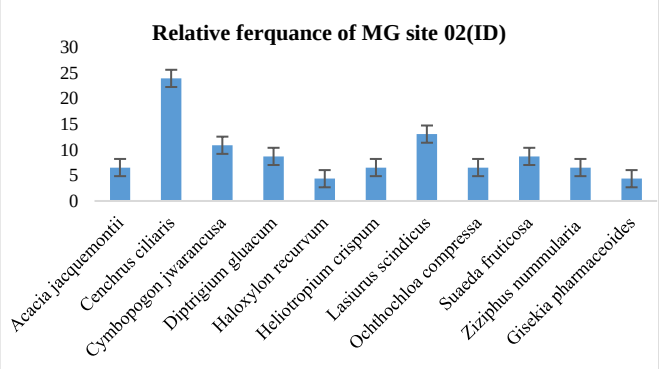


Figure 19
Relative Cover of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Fall Season 2021

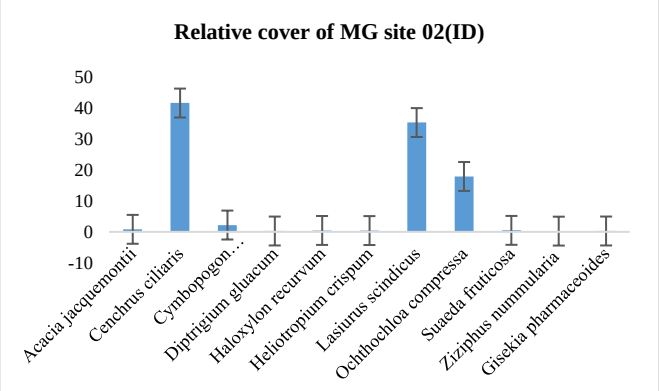
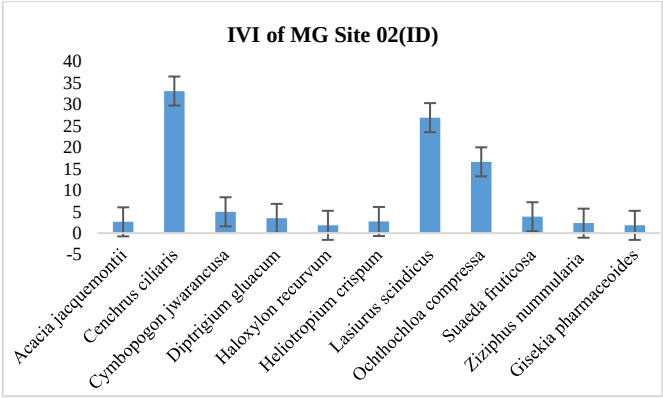


Figure 20
IVI of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Fall Season 2021



Site 2 (Mauj Garh Fort) and sub site 03 clayey land

Haloxylon salicarnicum has very high relative density, *Calotropis procera* has moderate while *Acacia nilotica* has very low relative density (Figure 21) *Calotropis procera* has very high relative frequency, *Capparis decidua* has moderate while *Calligonum polygonoides* has very relative frequency (Figure 22)

Haloxylon salicarnicum has very high relative cover. *Acacia nilotica, Tribulus longipetalus* have moderate while *Diptrigium gluacum, Capparis decidua* have very low relative cover. (Figure 23) *Haloxylon salicarnicum* has very high IVI. *Suaeda fruticosa* has moderate while *Diptrigium gluacum, Leptadenia pyrotechnica* and *Capparis decidua* have very low IVI. (Figure 24) Diversity index of Mauj Garh Fort species found at clayey land i.e. (0.846099).

Figure 21
Relative Density of Clayey Land(CL) In Livestock Farm (Mauj Garh) In Fall Season 2021

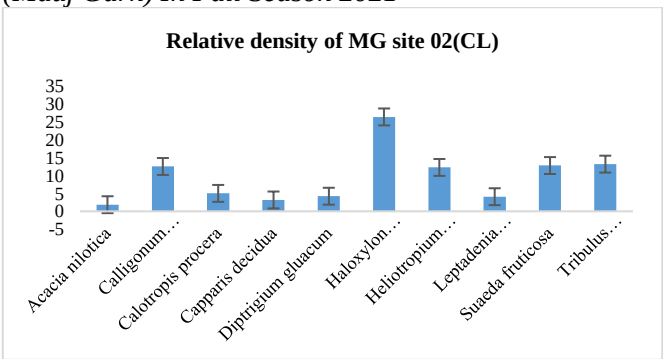


Figure 22
Relative Frequency of Clayey Land(CL) In Livestock Farm (Mauj Garh) In Fall Season 2021

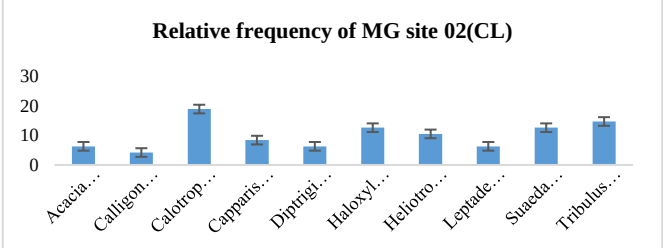


Figure 23

Relative Cover of Clayey Land(CL) In Livestock Farm (Mauj Garh) In Fall Season 2021

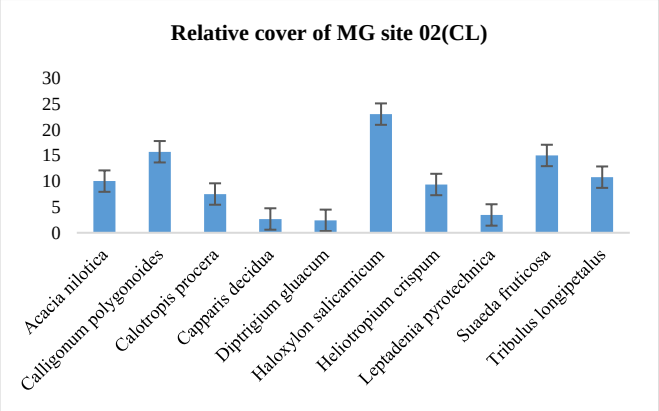
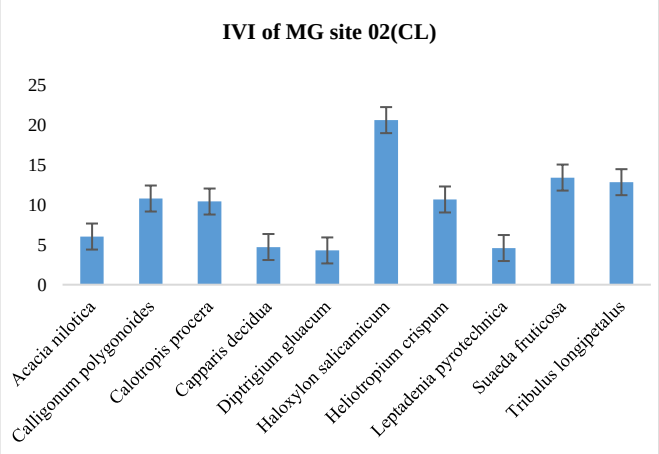


Figure 24

IVI of Clayey Land(CL) In Livestock Farm (Mauj Garh) In Fall Season 2021



Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) has three sub sites i.e. sand dune, inter dune and clayey land.

Site 3 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) and sub site 01 sand dune

Lasiurus scindicus has very high relative density. *Cymbopogon jwarancusa*, *Haloxylon salicarnicum* have moderate while *Tamarix aphylla* has very low relative density (Figure 25) *Lasiurus scindicus* has very high relative frequency. *Eragrostis nigra* has moderate while *Aristida faniculata*, *Cenchrus ciliaris* have very low relative frequency (Figure 26)

Lasiurus scindicus has very high relative cover, *Haloxylon salicarnicum* has moderate and *Eragrostis nigra*, *Aristida faniculata* have very low relative cover (Figure 27*) Lasiurus scindicus* has very high IVI, *Cenchrus biflorus* has moderate while *Aristida faniculata* has very low IVI (Figure 28) Diversity index of species found in SZCBC i.e. (0.855331).

Figure 25

Relative Density of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

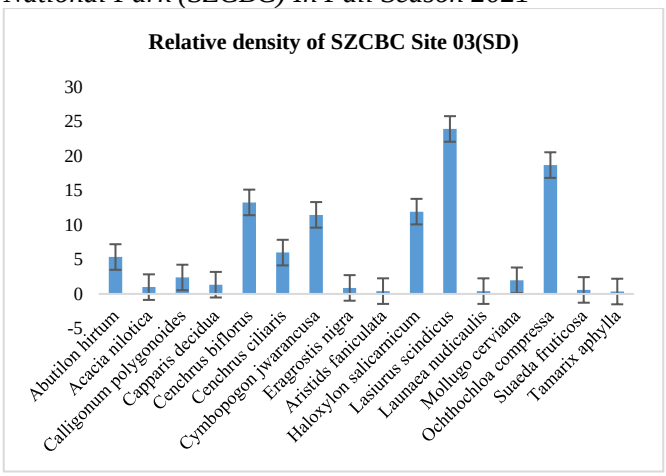


Figure 26

Relative Frequance of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

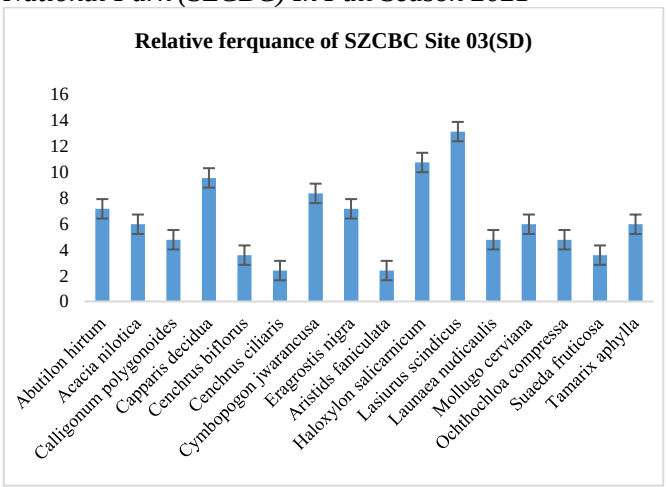


Figure 27

Relative Cover of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

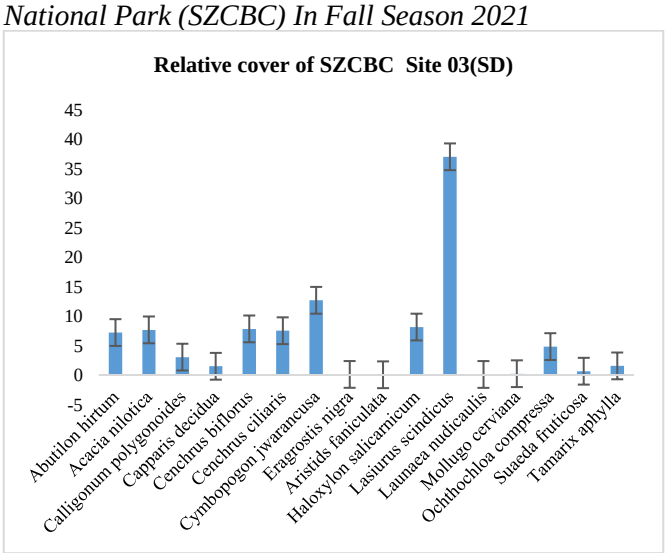
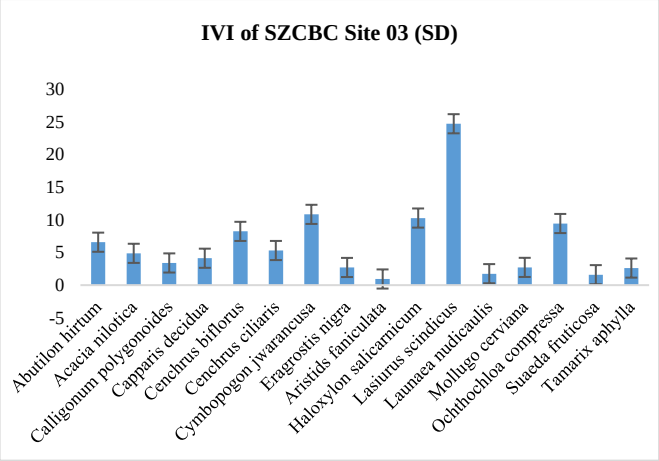


Figure 28

IVI of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Fall Season 2021



Site 3 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) and sub site 02 inter dune

Cymbopogon jwarancusa has very high relative density, *Ochthochloa compressa, Launaea residifolia* has moderate while *Tribulus longipetalus, Prosopis cineraria, Peganum harmala* have very low relative density (Figure 29) *Cymbopogon jwarancusa* has very high relative frequency, *Ochthochloa compressa, Haloxylon salicarnicum* and *Salsola imbricate* have moderate while *Calligonum polygonoides* has very low relative frequency (Figure 30)

Cymbopogon jwarancusa, Salsola imbricate and *Ochthochloa compressa* have very high relative cover, *Capparis decidua* and *Haloxylon salicarnicum* have moderate while *Haloxylon recurvum* and *Salsola bryosma* have very low relative cover (Figure 31*) Salsola imbricate* has very high IVI, *Capparis decidua* has moderate while *Salsola bryosma* has very low IVI (Figure 32) Diversity index of species found of SZCBC inter dune i.e. (0.862686711).

Figure 29

Relative Density of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

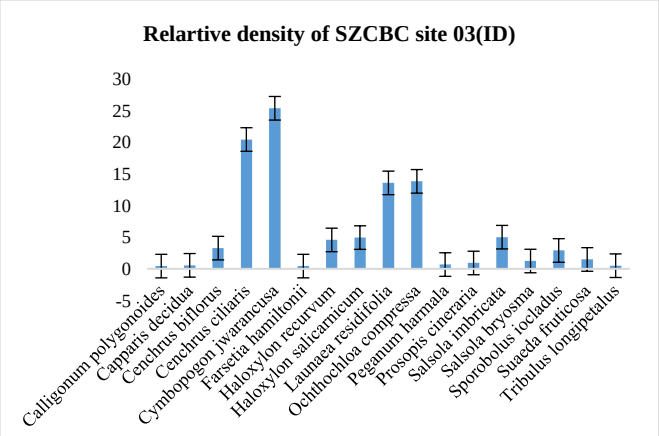


Figure 30

Relative Frequency of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

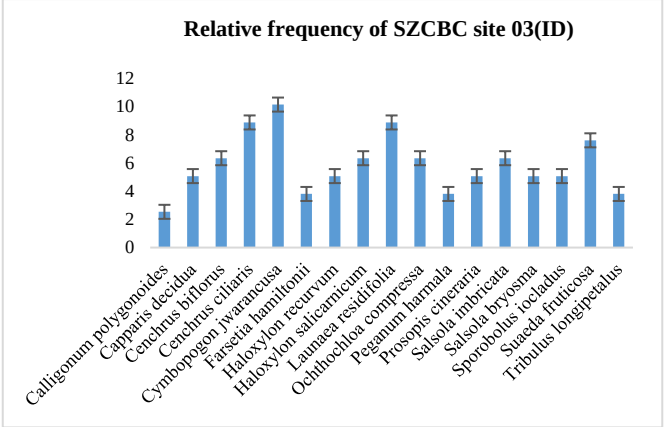


Figure 31

Relative Cover of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

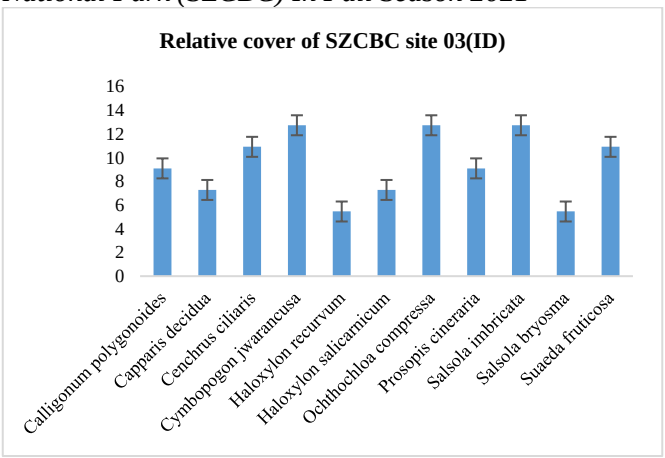
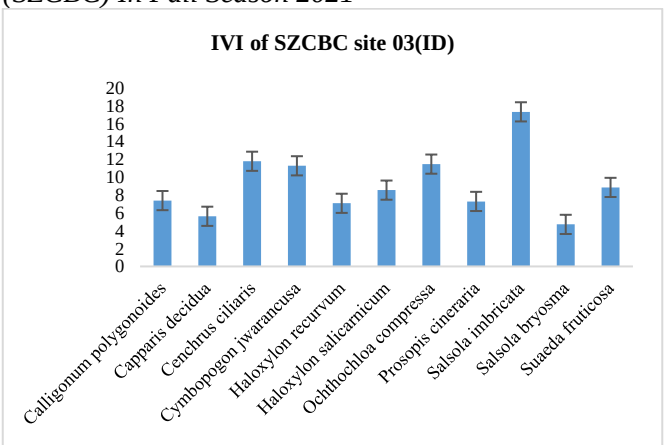


Figure 32

IVI of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Fall Season 2021



Site 3 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) and sub site 03 clayey land

Haloxylon salicarnicum has very high relative density, *Suaeda fruticose* has moderate while *Capparis decidua* has very low relative density (Figure 33) *Haloxylon salicarnicum* and *Lasiurus scindicus* have very high

relative frequency, Salsola bryosma has moderate while *Cenchrus ciliaris* has very low relative frequency (Figure 34)

Ochthochloa compressa has very high relative cover, *Haloxylon salicarnicum* has moderate while *Prosopis cineraria* has very low relative cover (Figure 35) *Ochthochloa compressa* has very high IVI, *Suaeda fruticose* has moderate while *Capparis decidua* has very low IVI (Figure 36) Diversity index species of species found in SZCBC clayey land i.e. (0.808212).

Figure 33

Relative Density of Clayey Land(CL) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

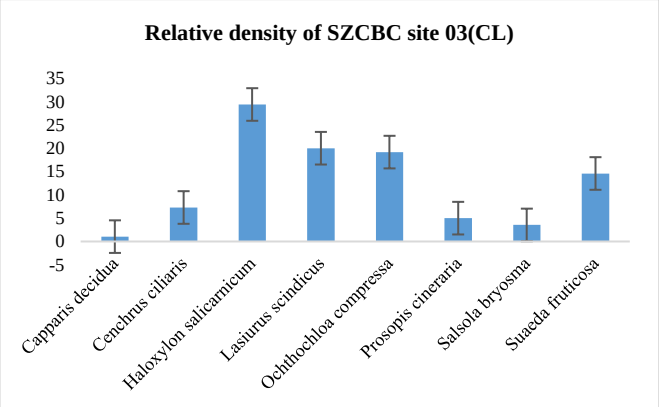


Figure 34

Relative Frequency of Clayey Land(CL) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

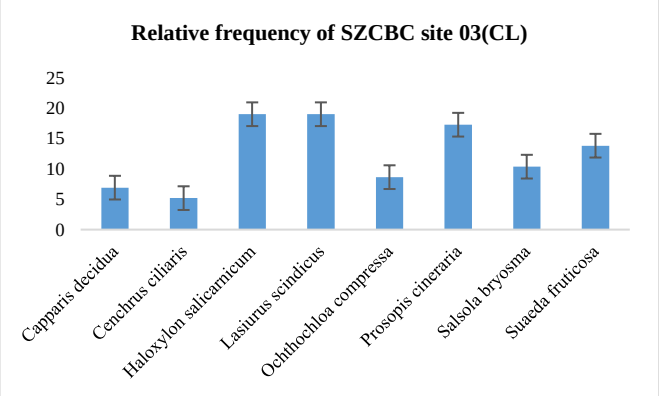


Figure 35

Relative Cover of Clayey Land(CL) In Lal Sohanra National Park (SZCBC) In Fall Season 2021

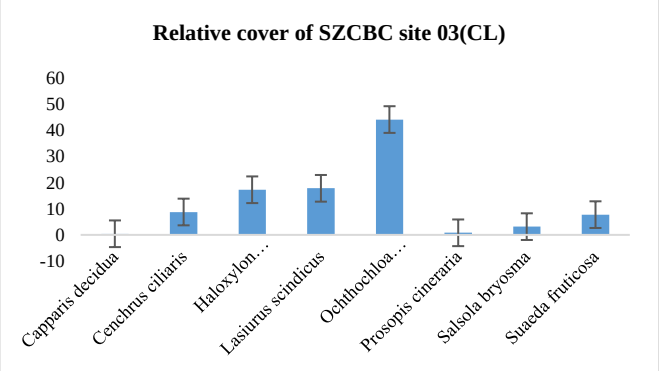
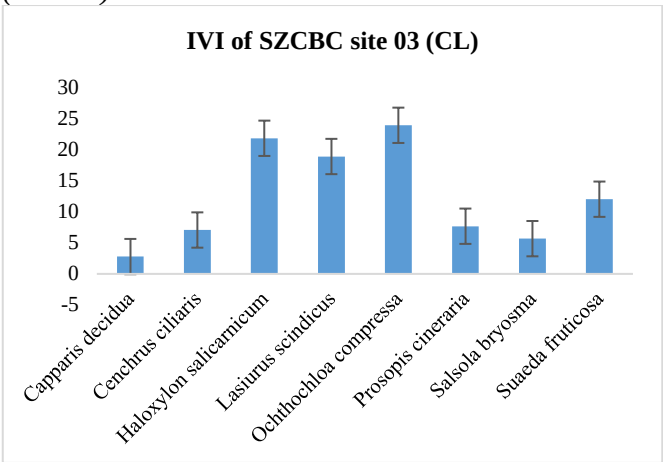


Figure 36

IVI of Clayey Land(CL) In Lal Sohanra National Park (SZCBC) In Fall Season 2021



Spring Season 02 (February to March)

In the spring season 02 we have studied three sites for collection data i.e. Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) and Mauj Garh Fort (Livestock farm) which have sub sites as given sand dune, inter dune and clayey land. At every sub site 11 quadrats were placed and which are collectively 33 quadrats at every sites, during the study. After the completion of the study 25 families are reported in all three sites. These families cover the 48 species of plants (Table no.10) During the study the parameter which we covered are density, relative density, relative frequency, cover, relative cover, importance value index, and abundance and diversity index the three sites are mentioned.

Table 10

All the families and species of quadrats of study recorded at all three sites Derawar Fort (Biodiversity park IUB) Lal Sohanra National Park (Sheikh Mohammed Bin Zayden Al-Nahyan Conservation and Breeding Center) and Moj Garh Fort (Livestock farm). And sub sites during spring saeson 2022.

S.NO.	Family	Scientific name
1	Amaranthanceae	*Aerva javanica* *Haloxylon recurvum* *Chenopodium album* *Haloxylon salicarnicum* *Salsola bryosma* *Suaeda fruticosa* *Salsola imbricate*
2	Apocynaceae	*Calotropis procera*
3	Apocynaceae	*Leptadenia pyrotechnica*
4	Asteraceae	*Launaea nudicaulis* *Launaea residifolia* *Silybum marianum*
5	Boraginaceae	*Heliotropium crispum*
6	Brassicaceae	*Brassica campestris* *Farsetia hamiltonii*
7	Caparaceae	*Capparis decidua*
8	Capparidaceae	*Diptrigium gluacum*
9	Convolvulaceae	*Convolvulus prostrates*

10	Cruciferae	*Farsetia hamiltonii*
11	Cucurbitaceae	*Citrullus colocynthis*
12	Cyperaceae	*Cyperus rotundus*
13	Fabaceae	*Acacia nilotica,* *Prosopis cineraria* *Prosopis juliflora*
14	Gramineae	*Sporobolus iocladus*
15	Malvaceae	*Abutilon hirtum*
16	Mimosaceae	*Acacia jacquemontii*
17	Molluginaceae	*Glinus lotoides*
18	Aizoaceae	*Mollugo cerviana*
19	Neuradaceae	*Neurada procumbens*
20	Poaceae	*Aristida hystricula* *Cenchrus biflorus* *Cenchrus ciliaris* *Cymbopogon jwarancusa* *Cynodon dactylon* *Lasiurus scindicus* *Ochthochloa compressa* *Panicum antidotale* *Eragrostis nigra* *Aristida funiculata*
21	Polygonaceae	*Calligonum polygonoides*
22	Rhamnaceae	*Ziziphus mauritiana* *Ziziphus nummularia*
23	Solanaceae	*Withania coagulans*
24	Tamaricaceae	*Tamarix aphylla*
25	Zygophyllaceae	*Fagonia cretica* *Tribulus longipetalus* *Tribulus terrestris*

Derawar Fort (Biodiversity park IUB)

The biodiversity park IUB have three sub sites sand dune, inter dune and clayey land.

Site 01 (Biodiversity Park) of sub site 01 sand dune

Ochthochloa compressa has very high relative density, *Suaeda fruticose* has moderate while *Salvadora oleiodes* has very low relative density (Figure 37) *Lasiurus scindicus* has very high relative frequency, *Salvadora oleiodes* has moderate while *Aristida hystricula* has very low relative frequency (Figure 38)

Ochthochloa compressa has very high relative cover, *Prosopis cineraria* has moderate while *Tribulus terrestris* has very low relative cover (Figure 39) *Ochthochloa compressa* has very high IVI. *Suaeda fruticose* has moderate while and *Aristida hystricula* have very low IVI (Figure 40) Diversity index of species found in Biodiversity park at sand dune i.e. (0.769184065).

Figure 37

Relative Density of Sand Dune (SD) In Biodiversity Park (Derawar) In Spring Season 2022

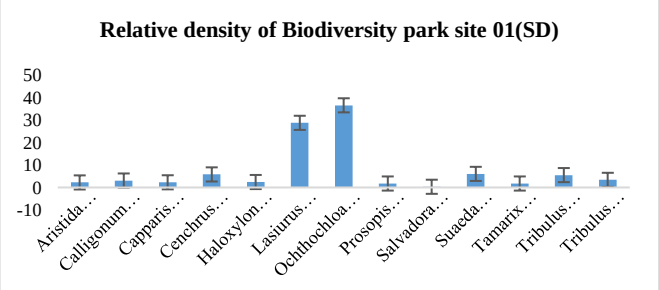


Figure 38

Relative Frequency of Sand Dune (SD) In Biodiversity Park (Derawar) In Spring Season 2022

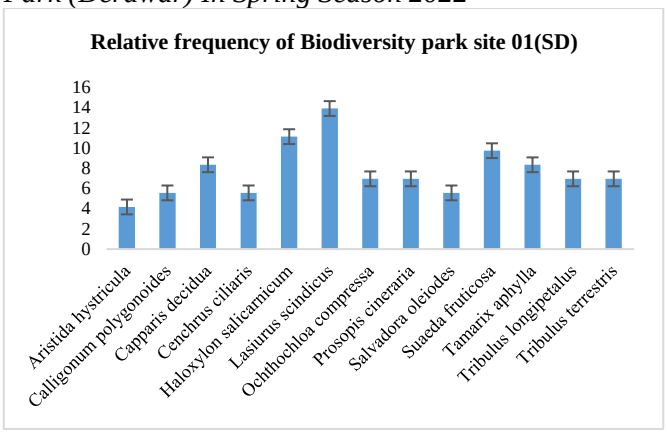


Figure 39

Relative Cover of Sand Dune (SD) In Biodiversity Park (Derawar) In Spring Season 2022

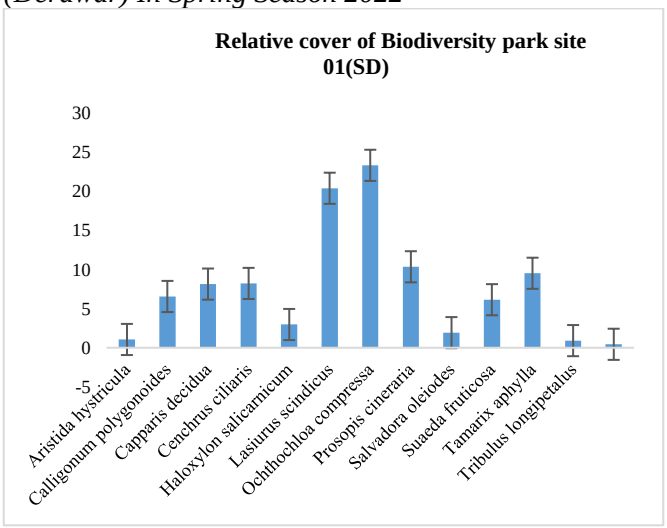
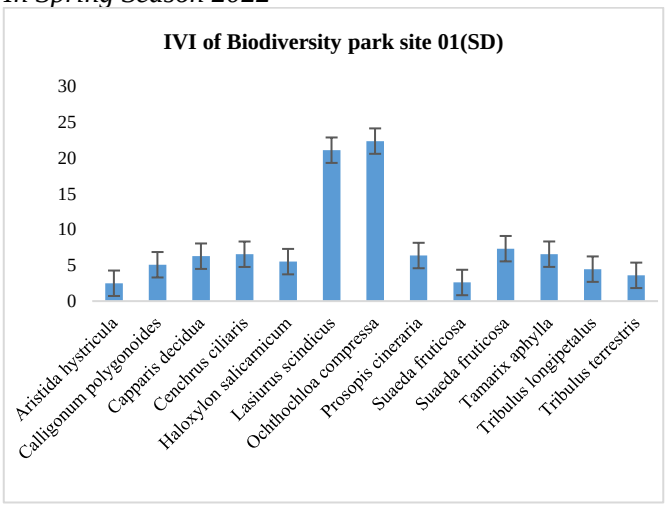


Figure 40

IVI of Sand Dune (SD) In Biodiversity Park (Derawar) In Spring Season 2022



Site 01 of (Biodiversity Park) of sub site 02 inter dune

Ochthochloa compressa has very high relative density,

Cenchrus ciliaris has moderate while *Salsola imbricate* and *Haloxylon salicarnicum* have very low relative density (Figure 41) *Haloxylon salicarnicum* and *Cymbopogon jwarancusa* have very high relative frequency, *Cenchrus ciliaris* has moderate while *Haloxylon salicarnicum* has very low relative frequency (Figure 42)

Cenchrus ciliaris has very high relative cover, *Lasiurus scindicus* has moderate while *Haloxylon salicarnicum* has very low relative cover (Figure 43) *Ochthochloa compressa* has very high IVI. *Lasiurus scindicus* has moderate while *Haloxylon salicarnicum* has very low IVI. (Figure 44) The Diversity index of species found in Biodiversity park inert dune i.e. (0.474753805).

Figure 41

Relative Density of Inter Dune (ID) In Biodiversity Park (Derawar) In Spring Season 2022

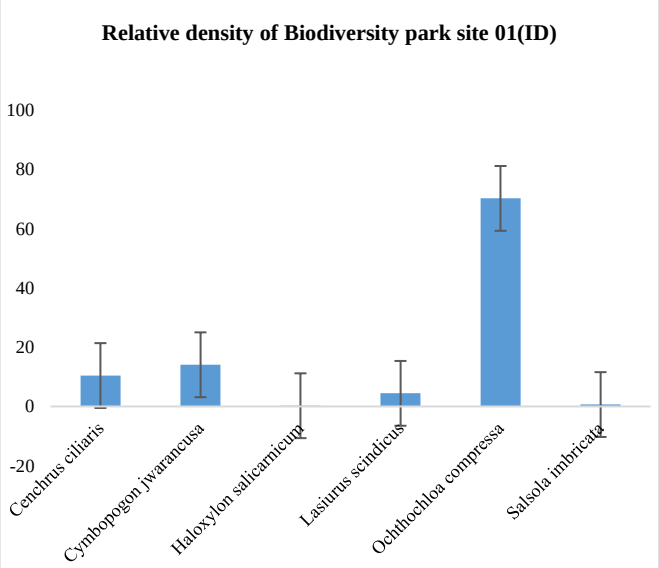


Figure 42

Relative Frequency of Inter Dune (ID) In Biodiversity Park (Derawar) In Spring Season 2022

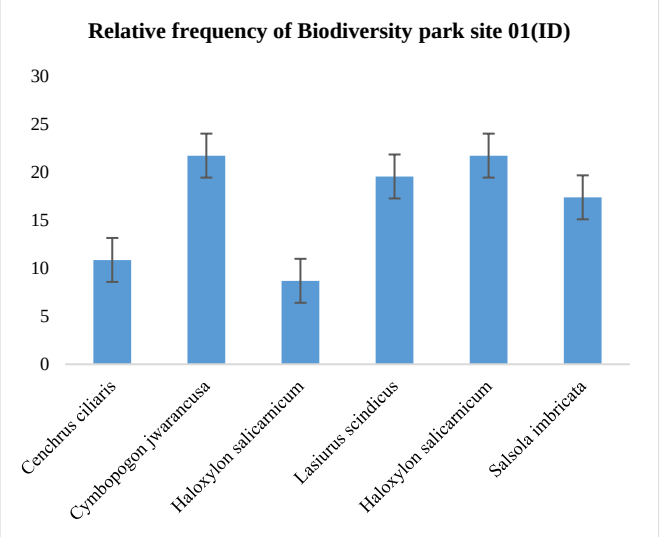


Figure 43

Relative Cover of Inter Dune (ID) In Biodiversity Park (Derawar) In Spring Season 2022

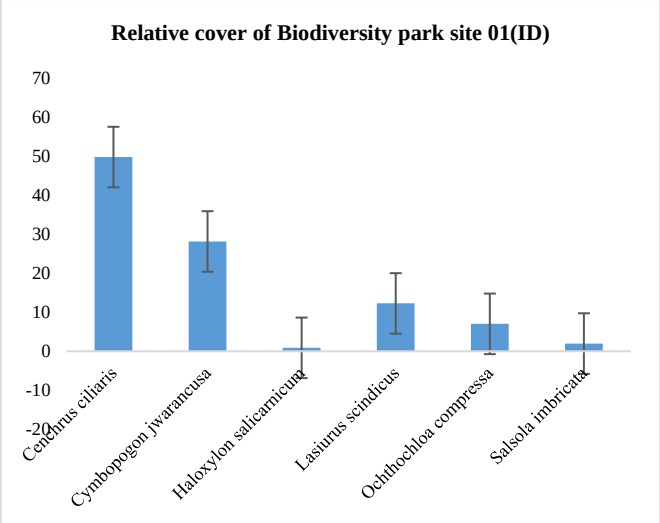
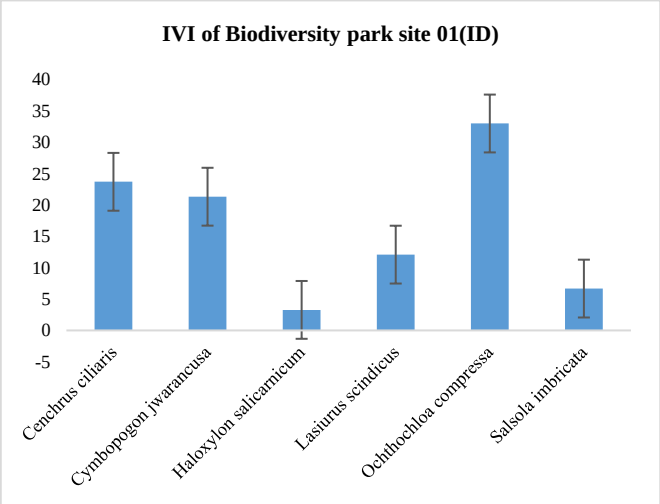


Figure 44

IVI of Inter Dune (ID) In Biodiversity Park (Derawar) In Spring Season 2022



Site 01 of (Biodiversity Park) of sub site 03 clayey land

Haloxylon salicarnicum has very high relative density, *Haloxylon recurvum* has moderate while *Cymbopogon jwarancusa* has very low relative density (Figure 45) *Suaeda fruticose* has very high relative frequency, *Ochthochloa compressa* has moderate while *Cymbopogon jwarancusa* has very low relative frequency (Figure 46)

Haloxylon recurvum has very high relative cover, *Haloxylon salicarnicum* has moderate while *Ochthochloa compressa* has very low relative cover (Figure 47) *Haloxylon salicarnicum* has very high IVI. *Haloxylon recurvum* has moderate while *Cymbopogon jwarancusa* has very low IVI (Figure 48) Diversity index of species found in Biodiversity park clayey land i.e. (0.826418693).

Figure 45

Relative Density of Clayey Land (CL) In Biodiversity Park (Derawar) In Spring Season 2022

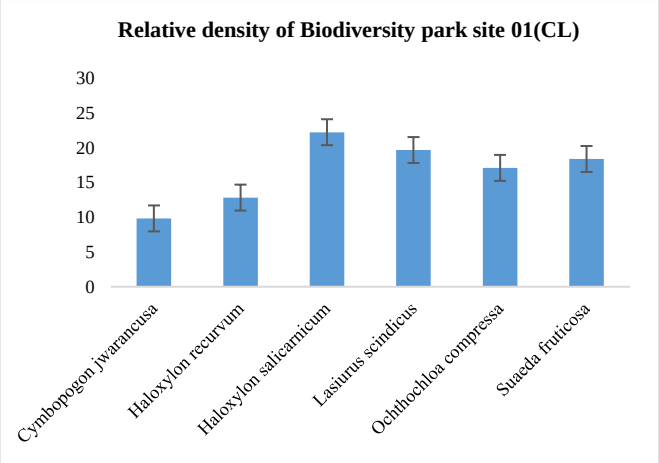


Figure 46

Relative Frequency of Clayey Land (CL) In Biodiversity Park (Derawar) In Spring Season 2022

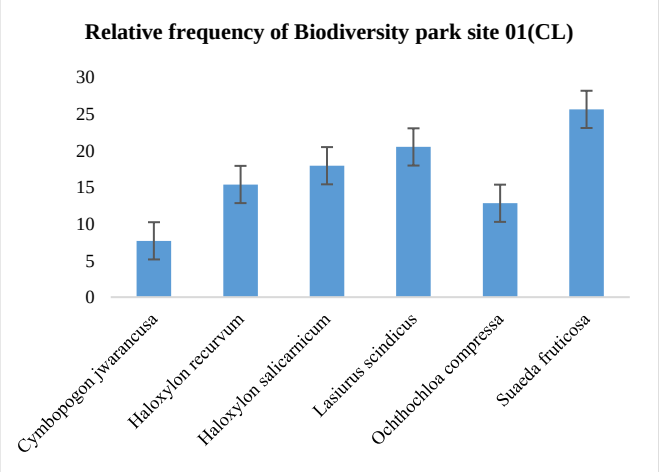


Figure 47

Relative Cover of Clayey Land (CL) In Biodiversity Park (Derawar) In Spring Season 2022

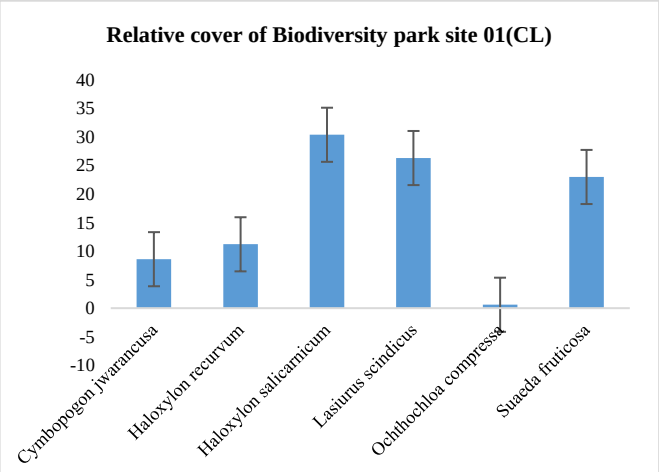
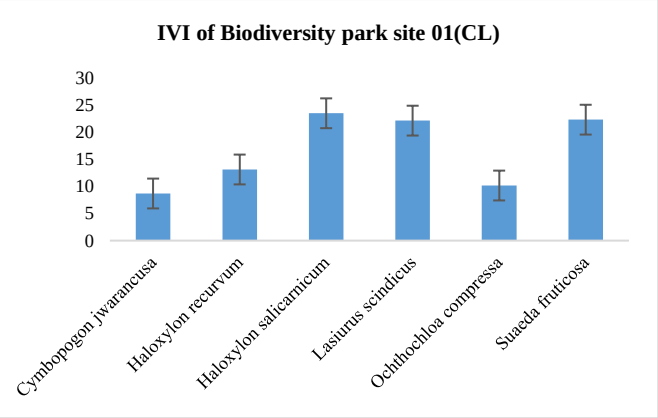


Figure 48

IVI of Clayey Land (CL) In Biodiversity Park (Derawar) In Spring Season 2022



Mauj Garh Fort (Livestock farm)

The site 2 have three sub site i.e. sand dune, inter dune and clayey land.

Site 02 (Mauj Garh Fort) of sub site 01 sand dune

Lasiurus scindicus has very high relative density, *Salsola bryosma* and *Haloxylon salicarnicum* have moderate while *Ziziphus mauritiana* has very low relative density (Figure 49) *Calotropis procera* has very high relative frequency, *Lasiurus scindicus* and *Diptrigium gluacum* have moderate while *Ochthochloa compressa* has very low relative frequency (Figure 50)

Lasiurus scindicus has very high relative cover, *Haloxylon salicarnicum* and *Capparis decidua* have moderate while *Ochthochloa compressa* has very low relative cover (Figure 51) *Lasiurus scindicus* and *Calotropis procera have* very high IVI. *Salsola bryosma* has moderate *Ochthochloa compressa* has very low IVI. (Figure 52). Diversity index of species found in Mg sand dune i.e. (0.852336789).

Figure 49

Relative Density of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Spring Season 2022

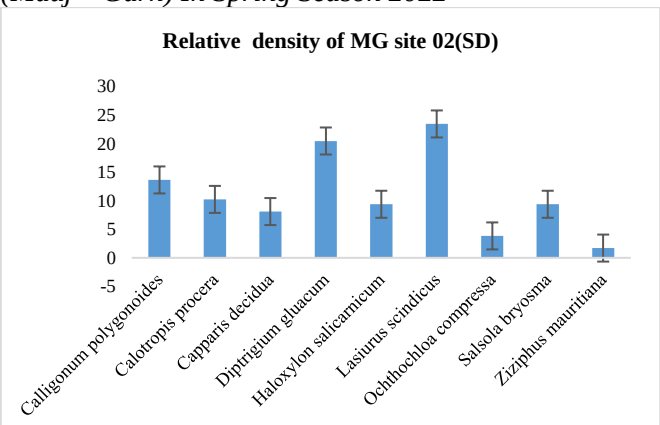


Figure 50
Relative Frequency of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Spring Season 2022

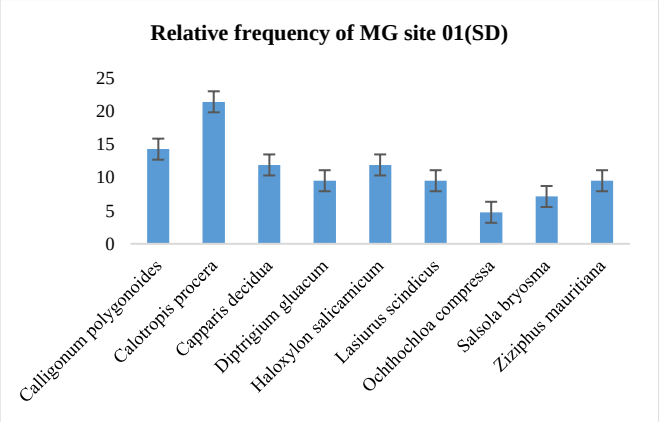


Figure 51
Relative Cover of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Spring Season 2022

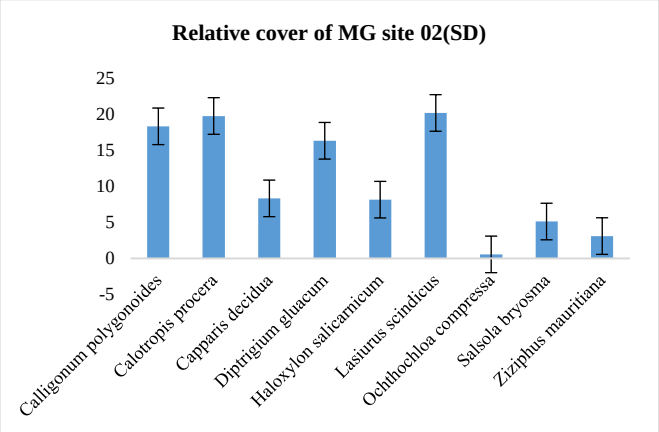
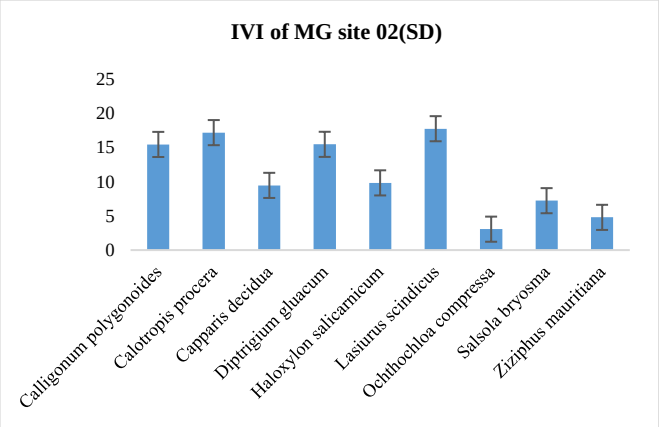


Figure 52
IVI of Sand Dune (SD) In Livestock Farm (Mauj Garh) In Spring Season 2022



Site 02 (Mauj Garh Fort) of sub site 02 Inter dune
Lasiurus scindicus has very high relative density, *Diptrigium gluacum* and *Cymbopogon jwarancusa* have moderate while *Cynadon dactylon* has very low relative density (Figure 53) *Lasiurus scindicus* has very high relative frequency, *Diptrigium gluacum* has moderate while *Cynadon dactylon* has very low relative frequency (Figure 54) *Lasiurus scindicus* has very high relative cover, *Diptrigium gluacum* has moderate while *Ochthochloa compressa* has very low relative cover (Figure 55) *Lasiurus scindicus* has very IVI. *Cenchrus ciliaris*, *Cymbopogon jwarancusa* and *Diptrigium gluacum* have moderate while *Cynadon dactylon* has very low IVI. (Figure 56) Diversity index of species found of MG inter dune i.e. (0.717751059).

Figure 53
Relative Density of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Spring Season 2022

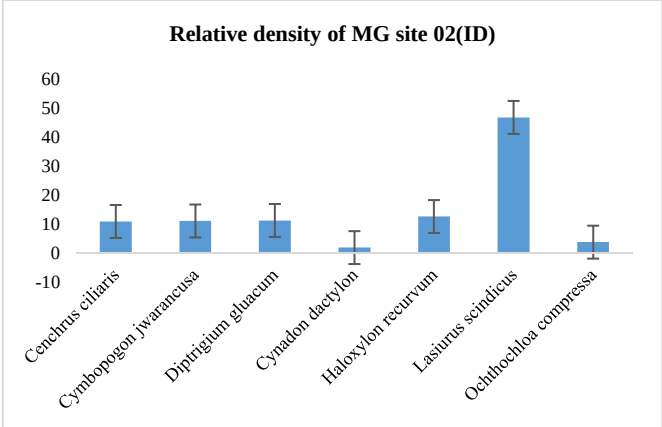


Figure 54
Relative Frequency of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Spring Season 2022

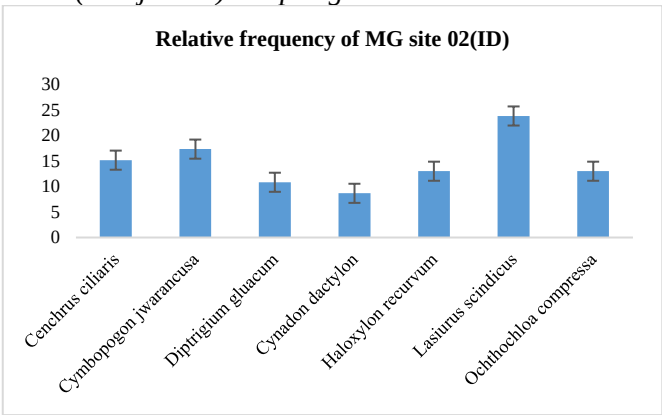


Figure 55
Relative Cover of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Spring Season 2022

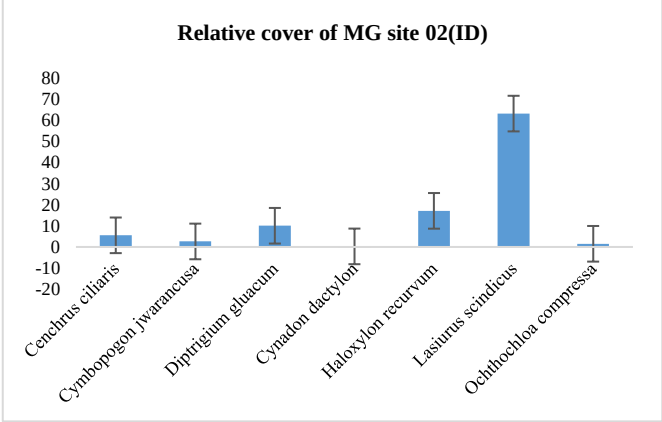
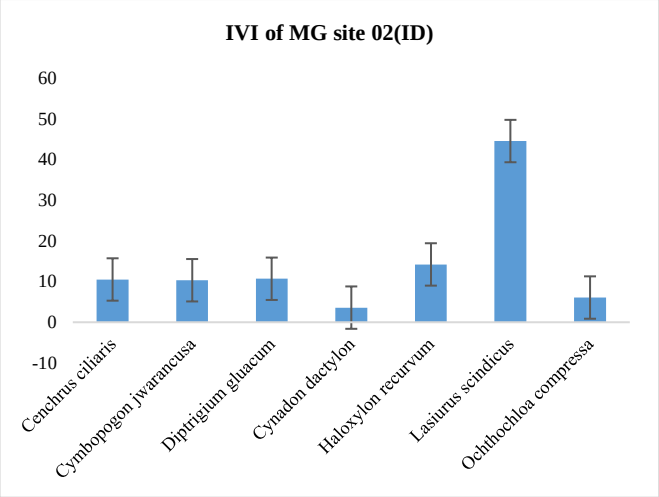


Figure 56
IVI of Inter Dune (ID) In Livestock Farm (Mauj Garh) In Spring Season 2022



Site 02 (Mauj Garh Fort) of sub site 03 clayey land
Suaeda fruticose has very high relative density, *Leptadenia pyrotechnica* has moderate while *Capparis decidua* has very low relative density (Figure 57*) Suaeda fruticose and Haloxylon salicarnicum* have very high relative frequency, *Leptadenia pyrotechnica* and *Acacia nilotica* have moderate while *Diptrigium gluacum* has very low relative frequency (Figure 58)

Acacia nilotica and *Haloxylon salicarnicum* have very high relative cover, *Leptadenia pyrotechnica* has moderate while *Capparis decidua* has very low relative cover (Figure 59) *Suaeda fruticose* very high IVI, *Calligonum polygonoides* moderate while *Capparis decidua* and *Calligonum polygonoides* have very low IVI. (Figure 60) Diversity index of species found in MG clayey land i.e. (0.807935758).

Figure 57
Relative Density of Clayey Land (CL) In Livestock Farm (Mauj Garh) In Spring Season 2022

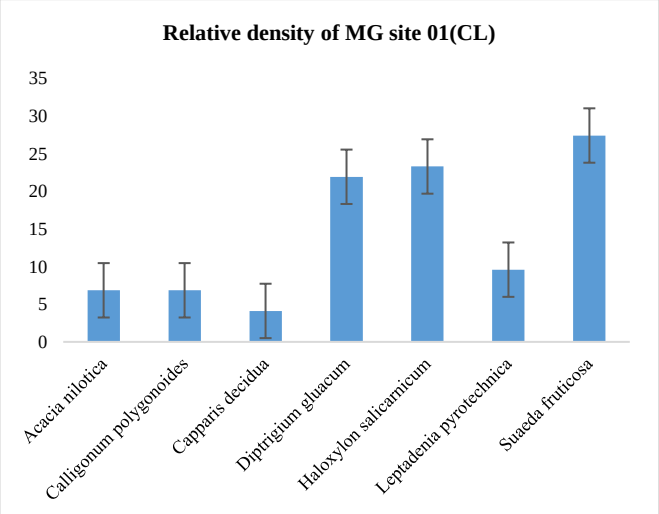


Figure 58
Relative Frequency of Clayey Land (CL) In Livestock Farm (Mauj Garh) In Spring Season 2022

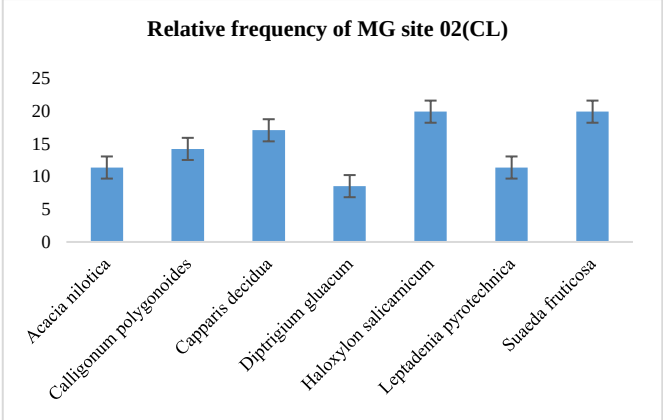


Figure 59
Relative Cover of Clayey Land (CL) In Livestock Farm (Mauj Garh) In Spring Season 2022

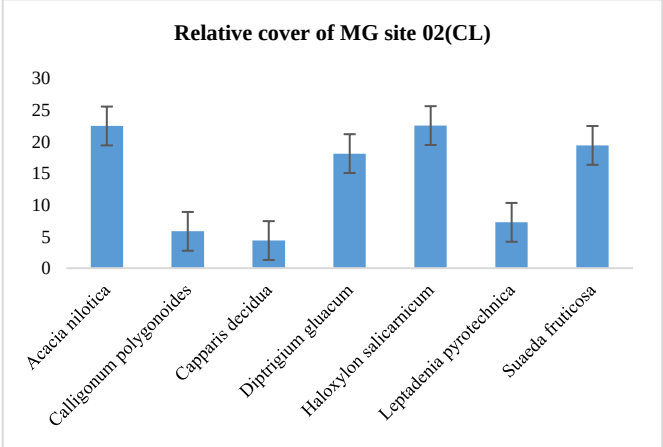
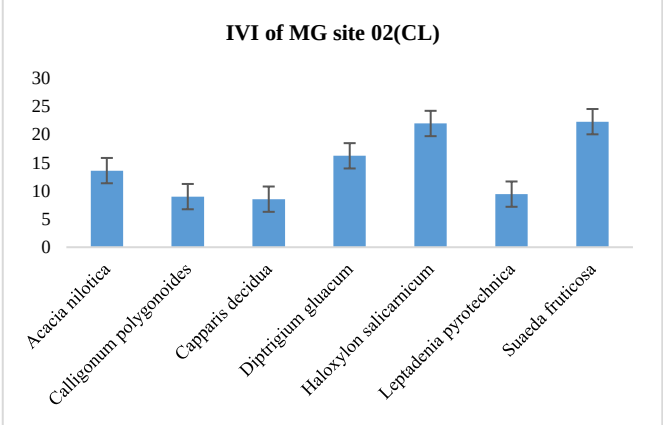


Figure 60
IVI of Clayey Land (CL) In Livestock Farm (Mauj Garh) In Spring Season 202



Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) has three sub sites i.e. sand dune, inter dune and clayey land

Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) of sub site 01 sand dune

Abutilon hirtum has very high relative density, *Acacia nilotica* and *Ochthochloa compressa* have moderate while *Cenchrus ciliaris* has very low relative density (Figure 61) *Capparis decidua* has very high relative frequency, *Ochthochloa compressa* has moderate while *Cenchrus ciliaris* has very low relative frequency (Figure 62)

Acacia nilotica has very high relative cover, *Calligonum polygonoides* has moderate while *Cenchrus ciliaris* has very low relative cover (Figure 63) *Acacia nilotica* has very high IVI. *Cymbopogon jwarancusa* has moderate while *Cenchrus ciliaris* has very low IVI. (Figure 64) The Diversity index of species found of SZCBC i.e. (0.889465576).

Figure 61

Relative Density of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

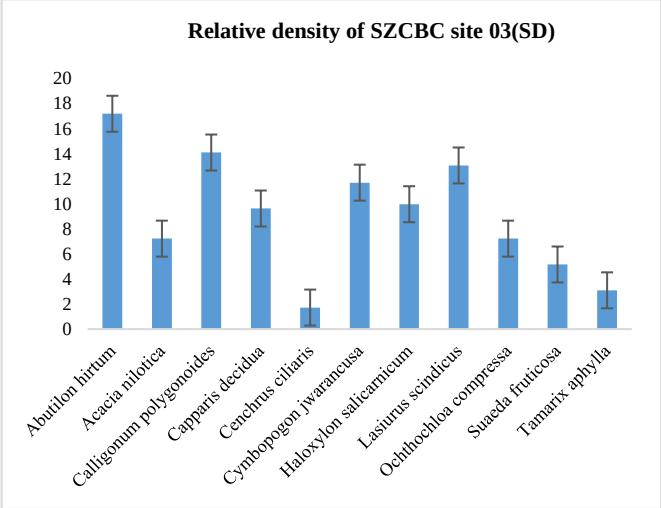


Figure 62

Relative Frequency of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

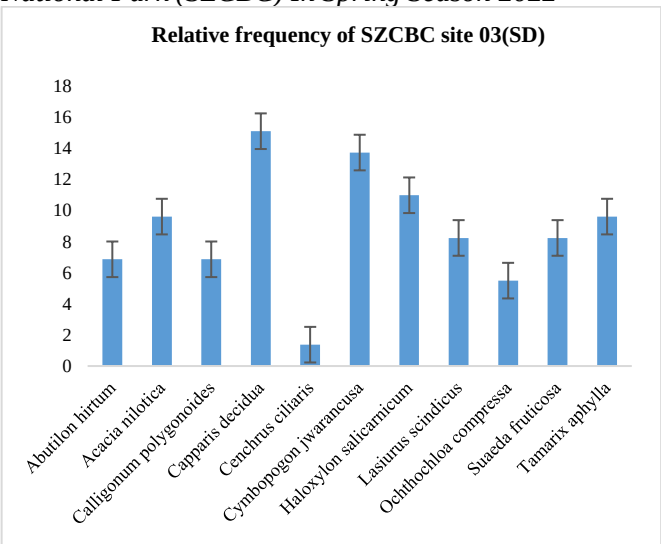


Figure 63

Relative Cover of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

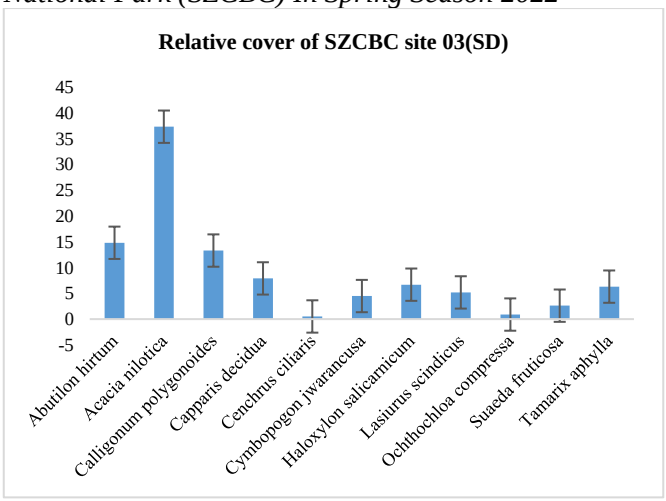
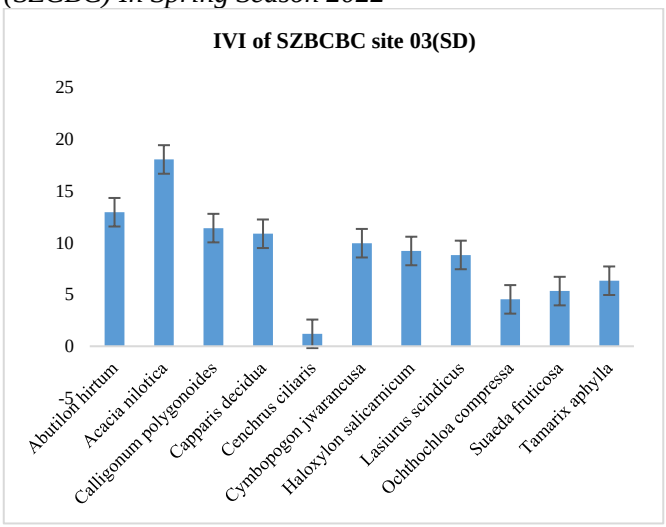


Figure 64

IVI of Sand Dune (SD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022



Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) of sub site 02 inter dune

Salsola imbricata has very high realtive density , *Cymbopogon jwarancusa* has moderate while *Capparis decidua* has very low realtive density (Figure 65) *Cymbopogon jwarancusa, Ochthochloa compressa* and *Salsola imbricata* have very high realtive ferquance , *Haloxylon salicarnicum* has moderte while *Salsola bryosma* has very low realative ferquance (Figure 66)

Salsola imbricata, Cymbopogon jwarancusa and *Ochthochloa compressa* have very high relative cover , *Haloxylon salicarnicum* has moderate while *Haloxylon recurvum* and *Salsola bryosma* have very low relative cover (Figure 67) *Salsola imbricata* has very high IVI ,*Haloxylon recurvum, Suaeda fruticosa* have moderate while *Salsola bryosma* has very low IVI (Figure 68) Diversity index of species found in SZCBC i.e. (0.862686711).

Figure 65

Relative Density of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

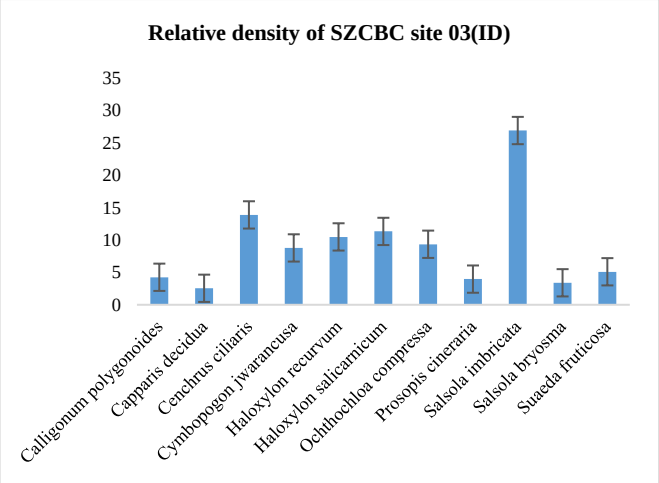


Figure 66

Relative Frequency of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

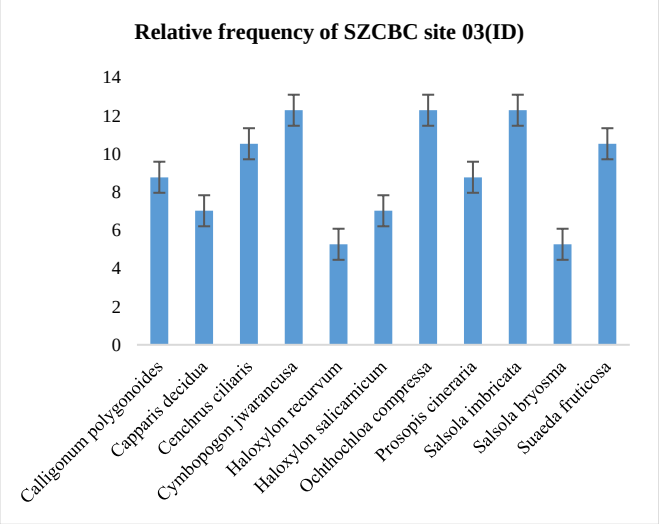


Figure 67

Relative Cover of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

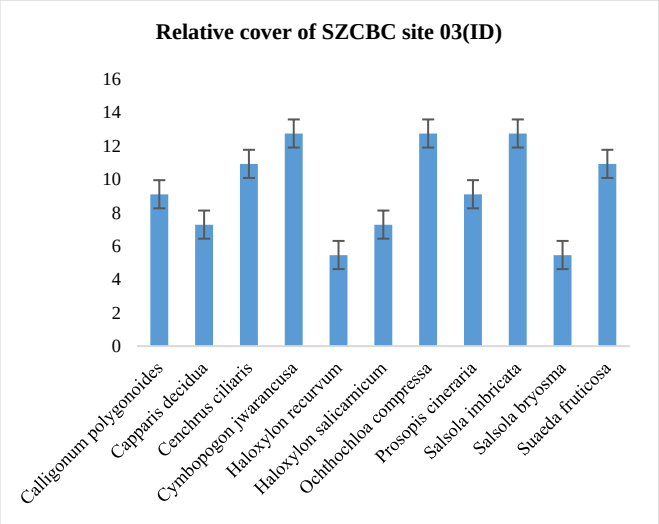
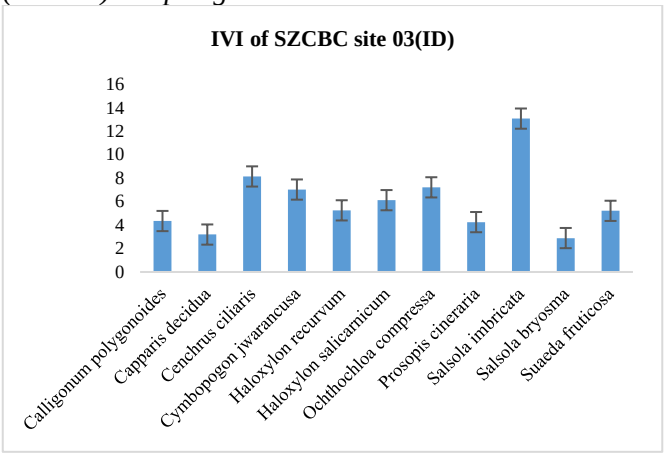


Figure 68

IVI of Inter Dune (ID) In Lal Sohanra National Park (SZCBC) In Spring Season 2022



Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center) of sub site 03 clayey land

Suaeda fruticose has very high relative density, *Haloxylon salicarnicum* has moderate while *Salsola bryosma* has very low relative diversity (Figure 69) *Suaeda fruticose* has very high relative frequency, *Prosopis cineraria* has moderate while *Salsola bryosma* has very low relative frequency (Figure 70)

Suaeda fruticose has very high relative cover, *Haloxylon salicarnicum* has moderate while *Prosopis cineraria* has very low relative cover (Figure 71*) Suaeda fruticose* has very high IVI. *Prosopis cineraria* has moderate while *Salsola bryosma* has very low IVI. (Figure 72) Diversity index of species in SZCBC i.e. (0.61682987).

Figure 69

Relative Density of ClayeyLand (CL) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

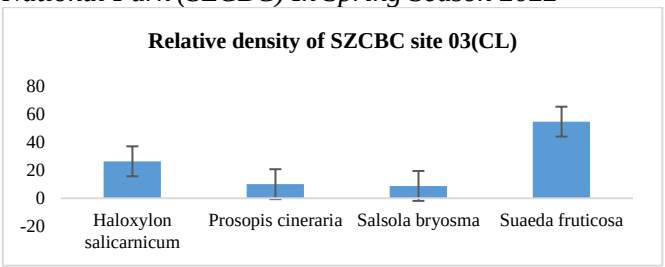


Figure 70

Relative Frequency of ClayeyLand (CL) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

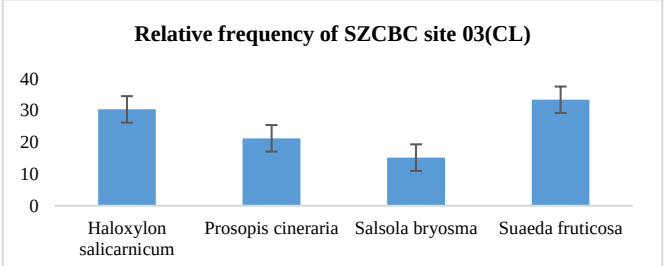


Figure 71
Relative Cover of ClayeyLand (LD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022

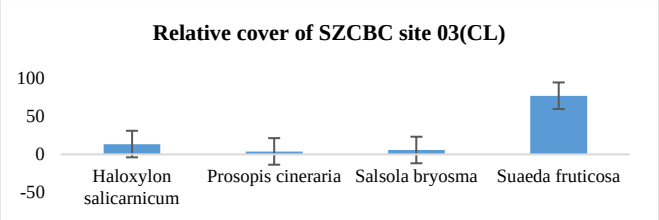
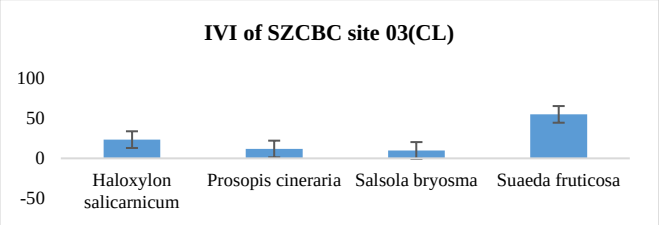


Figure 72
IVI of ClayeyLand (LD) In Lal Sohanra National Park (SZCBC) In Spring Season 2022



DISCUSSION

Relative Density of All Sites

Site 01 Derawar Fort (Biodiversity park IUB)

At season 01 site 01 *Tamarix aphylla* has very high relative density, *Lasiurus scindicus* has modest while *Prosopis cineraria* and *Salvadora oleiodes* have very low relative density. At season 02 site 01 *Ochthochloa compressa* has very high relative density, *Cenchrus ciliaris* has modest while *Salvadora oleiodes* and *Salsola* imbricate have very low relative density.

Site 02 Mauj Garh Fort (Livestock farm)

At season 01 site 02 *Cenchrus ciliaris* has very high relative density, *Suaeda fruticose* has modest while *Ziziphus nummularia* and *Indigofera argentea* have very low relative density. At season 02 site 02 *Lasiurus scindicus* has very high relative density, *Calligonum polygonoides* has modest while *Acacia nilotica* have very low relative density.

Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)

At season 01 site 03 *Haloxylon salicarnicum* has very high relative density, *Salsola imbricate* and *Haloxylon recurvum* have modest while *Tribulus longipetalus* and *Tamarix aphylla* have very low relative density. At season 02 site 03 *Suaeda fruticose* has very high relative density, *Cymbopogon jwarancusa* has modest while *Cenchrus ciliaris* has very low relative density.

Nisar *et al*. (2013) observed the Major shrub species' understory vegetation composition in Pakistan's Cholistan Desert. To ascertain how the many plant species that make up undergrowth plants correlate with one another, phytosociological and soil chemistry studies were conducted. Data for the species that make up the understory vegetation community covers of the two shrubs were provided for sample quadrats (1 m), and the relative cover, relative frequency, relative density, relative importance value index, as well as other outstanding measurements for each plant species were created using accepted techniques. The most prevalent species and their relationships with other subspecies have been determined to be two species of grass *(C. ciliaris and S. plumose)* and one shrub *(S. baryosma).* It has been discovered that some of the lower plant species don't communicate much with other subspecies.

Von Wehrden *et al*. (2021) conducted experiment on Plant communities of the Great Gobi B Strictly Protected Area, Mongolia. We used sample sites (relevés) that were 10 x 10 meters in size to represent the initial syntaxonomical view of vegetation t communities in the Great Gobi Severely Protected Area. Based on 211 plant samples that were collected in the summer of 2003, we discovered 16 plants. Eight semi-desert regions and out-of-area vegetation were given to six communities, and there are two mountain villages. The reported plant units are compared with known information from different Gobi locations.

Abdullah *et al*. (2020) studied the phytosociological assessment of browsing vegetation in association with edaphic factors in the cholistan rangelands of Pakistan. The Rangelands are a temporal and geographical program that is distinct from regions used for human habitation as well as those used to raise cattle and grow natural flora. The Chenopodiaceae, as well as Mimosaceae and Rhamnaceae, were identified as the dominant families in the research, which included a total of 25 species of herbs and shrubs over 12 families and 17 generations. The twenty browse communities were ranked according to importance Value Index (IVI) for each category in the plant study.

Amin *et al.* (1982) studied the Phytosociological studies of ayub national park Rawalpindi. In 1977, five 10 m 10 m quadrats were built up, one for each of the five park sites. Five species of society (community) were identified based on the significance of the tree, the values of the trees and shrubs, and the combined values (frequency + spread) of the trees and shrubs: stress. community *Acacia modesta/Cannabis sativa;* low-ground community *Acacia modesta/Cynodon dactylon* to foot hill community *Acacia modesta/Themeda anathera*; of the hill community *Acacia modesta/Dodonaea* The widespread occurrence of *A. modesta* restoration suggests that this species has little environmental effect. Future trends may be seen in higher values of the A-renewable integration *A. modesta, L. camara, Ehretia obtusifolia* (in all kinds), *Dondonaea viscosa* (in all species except for level), and *Zizyphus nummularia.*

Relative Frequency of All Sites

Site 01 Derawar Fort (Biodiversity park IUB)

At season 01 site 01 *Suaeda fruticose* has very high relative frequency, *Chenopodium album* has modest while *Salsola bryosma* and *Suaeda fruticose* have very low relative frequency. At season 02 site 01 *Suaeda fruticose* has very high relative frequency, *Cenchrus ciliaris* has modest while *Aristida hystricula* has very low relative frequency.

Site 02 Mauj Garh Fort (Livestock farm)

At season 01 site 02 *Cenchrus ciliaris* has very high relative frequency, B white flower has modest while *Indigofera argentea, Sporobolus iocladus* and *Ochthochloa compressa* have very low relative frequency. At season 02 site 02 *Lasiurus scindicus* has very high relative frequency, *Leptadenia pyrotechnica* has modest while *Ochthochloa compressa* has very low relative e frequency.

Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)

At season 01 site 03 *Lasiurus scindicus* has very high relative frequency, *Tamarix aphylla* and *Acacia nilotica* have modest while *Cenchrus ciliaris* and *Calligonum polygonoides* have very low relative frequency. At season 02 site 03 *Suaeda fruticose* has very high relative frequency, *Haloxylon salicarnicum* has modest while *Cenchrus ciliaris*. Has very low relative frequency

Arshad *et al*. (2008) point out spread of plants and edaphic elements inside the cholistan desert Pakistan. Identify most effective boundaries that account for the distribution of plant species in the Cholistan desert, the link between soil and vegetation features was evaluated. Fifteen sub-quadrats, every ranging 10 x 10 m, was equally positioned in each of the 3 stands, each ranging 100 x 100 meter. For order to control the density, frequency, coverage, and value indication, several plant species were examined. The outcome demonstrated a significant link between plant species and soil properties. Yavari *et al*. (2010) noticed the Floristic Study of Khan-Gormaz Protected Area in Hamadan Province, Iran Khan-Gormaz.This. The research planned for identifying and categorizing plant species and plants using the Eco-phytosociology technique. Based on the collecting, we have encountered 45 families and 213 cases spanning 164 generations. Asteraceae (24 generations), Brassicaceae (17 generations), Lamiaceae (16 generations), Poaceae (15 generations), and Apiaceae are the major families in this region (10 generations). Numerous Euro-Siberian (boreal) elements in the local mesic sections and Irano-Turanian elements in the local montane regions have a significant impact on local flower formation. Khan *et al*. (2011) observed of Chitral Gol National Park's (CGNP) Important Medicinal Plants of Pakistan. The present study is primarily concerned with ethnobotanical study of significant medicinal plants in Chitral Gol National Park. These herbs and bushes are utilized as remedies for a range of illnesses and serve as food, shelter, medicine, fodder, and numerous social functions. Locals used 31 trees, herbs, and the 21 family of plants as medicine, fence, and fuel. The local Hakims and roughly 100 informers were questioned about this. The most advantageous species to harvest are *Artemisia maritima*, *Artemisia brevifolia* and *Rosa webbiana*, but *Ephedra gerardiana* and *Ferula narthex* are endangered. This study may aid in the preservation of ethnobotanical knowledge since valuable ethnobotanical knowledge vanishes fast.

Relative Cover of All Sites

Site 01 Derawar Fort (Biodiversity park IUB)

At season 01 site 01 *Cenchrus ciliaris* has very high relative cover, *Tamarix dioica* has modest while *Salsola imbricate* has very low relative cover. At season 02 site 01 *Cenchrus ciliaris* has very high relative cover, *Haloxylon recurvum* has modest while *Tribulus longipetalus* and *Tribulus terrestris* have very low relative cover.

Site 02 Mauj Garh Fort (Livestock farm)

At season 01 site 02 *Cenchrus ciliaris* has very high relative cover, *Heliotropium crispum* has modest while *Indigofera argentea, Calotropis procera* and *Heliotropium crispum* have very low relative cover. At season 02 site 02 *Lasiurus scindicus* has very high relative cover, *Haloxylon salicarnicum* has modest while *Ochthochloa compressa* has very low relative cover.

Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)

At season 01 site 03 *Ochthochloa compressa* has very high relative cover, *Acacia nilotica* and *Suaeda fruticose* has modest while *Launaea nudicaulis* and *Mollugo cerviana* have very low relative cover. At season 02 site 03 *Suaeda fruticose* has very high relative cover, *Haloxylon salicarnicum* and *Capparis decidua* have modest while *Cenchrus ciliaris* and *Ochthochloa compressa* have very low relative cover. Hussain *et al*. (2010) observed the Phytosociology and Organization of Pakistan's Northern Areas' Central Karakoram National Park (CKNP). Objective of the research was to assess the National Park's architecture and phytosocology. Point center quarter method (PCQ) and 1.5 m round areas per PCQ area are used for measuring tree species, whereas 20 3 x 5 m quadrats are employed to measure shrub species. Eight stands for shrubs and five stands for trees were carved. At two locations, a community *Picea smithiana* and *Pinus wallichiana* exists that is connected to *Juniperus excelsa* with a maximal basal area of m2, *Juniperus excelsa* achieved its lowest density in pure sites.

Schmid *et al*. (2021) studied the Phytosociology, ecology and plant species diversity of grasslands within nature protection sites near Zurich (Switzerland). This research contains the Zurich region's dried to mesic grasslands and fields, which have significantly declined in Switzerland. Extremely humid and barely alkaline conditions prevailed in the Erliweid and Hofstetterweid regions. The Rohmatt, Schleetal, Stückliberg, and Tägerst are arid and very dry areas, with Stückliberg being the least fertile and Rohmatt being the most productive. 30 plant sites (10 m2) in total, or five sites in each of the six zones, were evaluated. In plant categorization, I have examined a few approaches used in Switzerland to offer phytosociological syntax.

Jabeen *et al*. (2009) noticed the Indigenous uses of economically important flora of Margallah Hills National Park, Islamabad, Pakistan Information on 245 valued plants for plants recognized in Marg Allah Hills National Park, Islamabad, was obtained via informal talks with local residents. Long-time park residents have depended on the local vegetarian resources for food, medicine, firewood, and other customary needs. Local nomads use 159 plants (64.89%) as traditional medicine, 79 plants (32.24%) as cattle feed, 47 plants (19.18%) as wood, 33 plants (13.46%) as food (fruit), 18 plants (7.34%) as vegetables, 14 plants (5.71%) as wood, 6 (2.44%) as industrial, 4 plants (1.63%) as tannin, 3 plants (1.22%) as gum, and 2 plants (0.81%) as fiber. 126 plant species.

Relative IVI of all sites

Site 01 Derawar Fort (Biodiversity park IUB)

At season 01 site 01 *Ochthochloa compressa* has very high IVI, *Lasiurus scindicus* has modest while *Chenopodium album* has very low IVI. At season 02 site 01 *Ochthochloa compressa* has very high IVI, *Lasiurus scindicus* has modest while *Aristida hystricula* has very low IVI.

Site 02 Mauj Garh Fort (Livestock farm)

At season 01 site 02 *Cenchrus ciliaris* has very high IVI. *Capparis decidua and Calligonum polygonoides* have modest while *Calotropis procera* and *C red flower* have very low IVI. At season 02 site 02 *Lasiurus scindicus* has very high IVI, *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)

At season 01 site 03. *Lasiurus scindicus* has very high IVI. *Abutilon hirtum* has modest while *Aristida fanaculata has* very low IVI. At season 02 site 03 *Suaeda fruticose* has very IVI. Lasiurus *scindicus* has modest while *Cenchrus ciliaris* has very low IVI. Malik *et al*. (2013) observed an Evaluation of Herbaceous Flora Ecological Distribution in Gatwala Forest Park, Faisalabad**,** Herbal plant taxonomy establishes a connection between researchers and resource managers. In the bottom plant area, random collections of floral data were made. As a result of the investigation, 46 distinct plant species and several families were identified. The data were separated using the Twinspan approach. *Panicum antidotale, Cenchrus pennisetiformis, Dichanthium annulatum, Cynodon dactylon, Coromandelianum malvastrum Stellaria medium, Ranunculus muricatus,* are the most notable species

Haq *et al*. (2020) studied the Forest communities and factors responsible for vegetation pattern in the legally protected areas of the Kashmir Himalaya, India Protected areas (PAs) of any zone contribute to human earnings and show to be the backbone of all biodiversity protection. According to the plants, a total of 84 species of 71 generations in 39 families were observed. According to vegetation research, Rosaceae with the species accounted for 14% of the top plant families in the study zone, followed by Asteraceae (8%) and the species Poaceae (7 percent). Nisar *et al*. (2013) studied the composition of understory vegetation in tree species of cholistan desert, Pakistan. In the present research, plants develop as undergrowth or communities beneath the desert's cholistan desert species' canopies. Under a tree canopy, 1 m^2 quadrats are set up to record various plant species and their frequency, density, and relative cover. For every vegetation types, the IVI, relative frequency, and density are calculated using following formula on basis of well used techniques. Due to their close ties to the Cholistan desert, *Stipagrostis plumosa, Salsola baryosma* and *Cenchrus cilaris*w were the main plant species that generated subspecies of tree species. The development of vegetation underneath tree species depends on the presence of other plant species.

Rasheed *et al*. (2021) conducted the experiment on ecological assessment and indicator species analyses of the cholistan desert using multivariate statistical tools. It was believed that the development of vegetation in the Cholistan Desert had a significant relationship with water, edaphic changes, and climate. In 100 Toba that were randomly chosen on each side, 4800 quadrats were put up. Quadrats of all vegetation types, including trees, shrubs, and herbs, was, correspondingly, 64 square meters, 16 square meters, and 1 square meters. The collection of 49 vegetation types from 25 different families was discovered in the Cholistan Desert. Four distinct plant communities were identified there by collection analysis and index analysis: The communities of *Prosopis-Dipterygium-Cymbopogon, Zizyphus-Suaeda-Cenchrus, Tamarix-HaloxylonTribulus,* as well as *Capparis-Calotropis-Zaleya* are among the first four communities communal.

Site 01 Derawar Fort (Biodiversity park IUB)
Relative Density of Season 01 and Season 02
Ochthochloa compressa has very high relative density, *Cenchrus ciliaris* has modest while *Salvadora oleiodes* and *Salsola imbricate* have very low relative density.

Relative Frequency of Season 01 and Season 02
Suaeda fruticose has very high relative frequency, *Cenchrus ciliaris* has modest while *Aristida hystricula* has very low relative frequency.

Relative Cover of Season 01 and Season 02
Cenchrus ciliaris has very high relative cover, *Haloxylon recurvum* has modest while *Tribulus longipetalus* and *Tribulus terrestris* have very low relative cover.

Relative IVI of Season 01 and Season 02
Lasiurus scindicus has very high IVI, *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

At Site 2 Mauj Garh Fort (Livestock farm)
Relative Density of Season 01 and Season 02
Lasiurus scindicus has very high relative density, *Calligonum polygonoides* has modest while *Ziziphus nummularia* and *Indigofera argentea*, very low relative density.

Relative Frequency of Season 01 and Season 02
Lasiurus scindicus has very high relative frequency, *Leptadenia pyrotechnica* has modest while *Ochthochloa compressa* has very low relative e frequency.

Relative Cover of Season 01 and Season 02
Lasiurus scindicus has very high relative cover, *Haloxylon salicarnicum* has modest while *Indigofera argentea*, *Calotropis procera* and *Heliotropium crispum* have very low relative cover.

Relative IVI of Season 01 and Season 02
Lasiurus scindicus has very high IVI, *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

At Site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center)

Relative Density of Season 01 and Season 02
Suaeda fruticose has very high relative density, *Cymbopogon jwarancusa* has modest while *Cenchrus ciliaris* has very low relative density

Relative Frequency of Season 01 and Season 02
Lasiurus scindicus has very high relative frequency, *Haloxylon salicarnicum* has modest while *Cenchrus ciliaris.* has very low relative frequency.

Relative cover of Season 01 and Season 02
Suaeda fruticose gas very high relative cover, *Haloxylon salicarnicum* and *Capparis decidua* have modest while *Cenchrus ciliaris* and *Ochthochloa compressa* have very low relative cover.

Relative IVI of Season 01 and Season 02
Suaeda fruticose has very IVI, *Lasiurus scindicus* has modest while *Aristida fanaculata* has very low IVI.

CONCLUSION

At site 01 Derawar Fort (Biodiversity park IUB). At season 01 site 01 *Tamarix aphylla* has very high relative density, *Lasiurus scindicus* has modest while *Prosopis cineraria* and *Salvadora oleiodes* have very low relative density. At season 02 site 01 *Ochthochloa compressa* has very high relative density, *Cenchrus ciliaris* has modest while *Salvadora oleiodes* and *Salsola imbricate* have very low relative density. At season 01 site 01 *Suaeda fruticose* has very high relative frequency, *Chenopodium album* has modest while *Salsola bryosma* and *Suaeda fruticose* have very low relative frequency. At season 02 site 01 *Suaeda fruticose* has very high relative frequency, *Cenchrus ciliaris* has modest while *Aristida hystricula* has very low relative frequency. At season 01 site 01 *Cenchrus ciliaris* has very high relative cover, *Tamarix dioica* has modest while *Salsola imbricate* has very low relative cover. At season 02 site 01 *Cenchrus ciliaris* has very high relative cover, *Haloxylon recurvum* has modest while *Tribulus longipetalus* and *Tribulus terrestris* have very low relative cover. At season 01 site 01 *Ochthochloa compressa* has very high IVI, *Lasiurus scindicus* has modest while *Chenopodium album* has very low IVI. At season 02 site 01 *Ochthochloa compressa* has very high IVI. *Lasiurus scindicus* has modest while *Aristida hystricula* has very low IVI.

At site 2 Mauj Garh Fort (Livestock farm). At season 01 site 02 *Cenchrus ciliaris* has very high relative density, *Suaeda fruticose* has modest while *Ziziphus nummularia* and *Indigofera argentea,* have very low relative density. At season 02 site 02 *Lasiurus scindicus* has very high relative density, *Calligonum polygonoides* has modest while *Acacia nilotica* have very low relative density. At season 01 site 02 *Cenchrus ciliaris* has very high relative frequency, B white flower has modest while *Indigofera argentea, Sporobolus iocladus* and *Ochthochloa compressa* have very low relative frequency. At season 02 site 02 *Lasiurus scindicus* has very high relative frequency, *Leptadenia pyrotechnica* has modest while *Ochthochloa compressa* has very low relative e frequency. At season 01 site 02 *Cenchrus ciliaris* has very high relative cover, *Heliotropium crispum* has modest while *Indigofera argentea, Calotropis procera* and *Heliotropium crispum* have very low relative cover. At season 02 site 02 *Lasiurus scindicus* has very high relative cover. *Haloxylon salicarnicum* has modest while *Ochthochloa compressa* has very low relative cover. At season 01 site 02 *Cenchrus ciliaris* has very high IVI. *Capparis decidua* and *Calligonum polygonoides* have modest while

Calotropis procera and *Gisekia pharmaceoides* have very low IVI. At season 02 site 02 *Lasiurus scindicus* has very high IVI. *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

At site 03 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). At season 01 site 03 *Haloxylon salicarnicum* has very high relative density, *Salsola imbricate* and *Haloxylon recurvum* have modest while *Tribulus longipetalus* and *Tamarix aphylla* have very low relative density. At season 02 site 03 *Suaeda fruticose* has very high relative density, *Cymbopogon jwarancusa* has modest while *Cenchrus ciliaris* has very low relative density. At season 01 site 03 *Lasiurus scindicus* has very high relative frequency, *Tamarix aphylla* and *Acacia nilotica* have modest while *Cenchrus ciliaris* and *Calligonum polygonoides* have very low relative frequency. At season 02 site 03 *Suaeda fruticose* has very high relative frequency, *Haloxylon salicarnicum* has modest while *Cenchrus ciliaris*. has very low relative frequency. At season 01 site 03 *Ochthochloa compressa* has very high relative cover, *Acacia nilotica* and *Suaeda fruticose* has modest while *Launaea nudicaulis* and *Mollugo cerviana* have very low relative cover. At season 02 site 03 *Suaeda fruticose* gas very high relative cover, *Haloxylon salicarnicum* and *Capparis decidua* have modest while *Cenchrus ciliaris* and *Ochthochloa compressa* have very low relative cover. At season 01 site 03. *Lasiurus scindicus* has very high IVI. *Abutilon hirtum* has modest while *Aristida fanaculata has* very low IVI. At season 02 site 03 *Suaeda fruticose* has very IVI. *Lasiurus scindicus* has modest while *Cenchrus ciliaris* has very low IVI.

At site 01 Both season 01 and 02 Derawar Fort (Biodiversity park IUB). *Ochthochloa compressa* has very high relative density, *Cenchrus ciliaris* has modest while *Salvadora oleiodes* and *Salsola imbricate* have very low relative density. *Suaeda fruticose* has very high relative frequency, *Cenchrus ciliaris* has modest while *Aristida hystricula* has very low relative frequency. *Cenchrus ciliaris* has very high relative cover, *Haloxylon recurvum* has modest while *Tribulus longipetalus* and *Tribulus terrestris* have very low relative cover. *Lasiurus scindicus* has very high IVI. *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

At site 02 Both season 01 and 02 Mauj Garh Fort (Livestock farm). *Lasiurus scindicus* has very high relative density, *Calligonum polygonoides* has modest while *Ziziphus nummularia* and *Indigofera argentea,* very low relative density. *Lasiurus scindicus* has very high relative frequency, *Leptadenia pyrotechnica* has modest while *Ochthochloa compressa* has very low relative e frequency. *Lasiurus scindicus* has very high relative cover, *Haloxylon salicarnicum* has modest while *Indigofera argentea, Calotropis procera* and *Heliotropium crispum* have very low relative cover. *Lasiurus scindicus* has very high IVI. *Cymbopogon jwarancusa* and *Cenchrus ciliaris* have modest while *Ochthochloa compressa* has very low IVI.

At site 03 Both season 01 and 02 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). *Suaeda fruticose* has very high relative density, *Cymbopogon jwarancusa* has modest while *Cenchrus ciliaris* has very low relative density. *Lasiurus scindicus* has very high relative frequency, *Haloxylon salicarnicum* has modest while *Cenchrus ciliaris*. Has very low relative frequency. *Suaeda fruticose* has very high relative cover, *Haloxylon salicarnicum* and *Capparis decidua* have modest while *Cenchrus ciliaris* and *Ochthochloa compressa* have very low relative cover. *Suaeda fruticose* has very IVI, *Lasiurus scindicus* has modest while *Aristida fanaculata* has very low IVI.

At site 01 Derawar Fort (Biodiversity park IUB). Diversity index of all species found at site 01 i.e. are (0.850964), (0.772363) and (0.806539). The average of Diversity index of all species are found at 01 (0.809955) At site 2 Mauj Garh Fort (Livestock farm). Diversity index of all species found at site 02 i.e. are (0.689986), (0.716662) and (0.846099). The average of Diversity index of all species are found at 02 (0.750915666) At site 3 Lal Sohanra National Park (Sheikh Mohammed Bin Zayed Al-Nahyan Conservation and Breeding Center). Diversity index of all species found at site 03 i.e. are (0.855331) (0.862686711). and (0.808212) The average of Diversity index of all species are found at 03 (0.842076) The average of Diversity index of all species are found at all three sites was (0.8009822). overall. these three sites play an important role in the conservation of many native species of desert that are otherwise facing multiple biotic abiotic anthropogenic stresses.

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