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Plant species diversity in Gonabad

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ABSTRACT

Gonabad located at Khorasan Razavi and coordinates 58^0 30' N 34^o 35' E. The highest point of the zone belongs to Peak of Siah Mountain (height of 2,863 meters above sea level) and the lowest place has height of 810 meters above sea level, which is located in North West in salt desert. The mean temperature of the warmest and coldest of year is 29.3 and 3.9 respectively. Moreover, mean of rainfall is 142.4 Millimeters. In current research, we studied in Gnabad's zone in Khorasan province. In Gonabd's zone growth 210 species and subspecies belonging to 131 genera and 34-plant family.

Key words: Flourine, Gonabad, Khorasan Province, Plant Species

INTRODUCTION

Meadows are one of the most valuable national and renewable resources. Proper operation along with correctional operations can play essential role in saving water, soil, and providing necessity of country about protein products. Meadows in addition benefits above mentioned , has vital role in providing byproducts such as industrial and pharmaceutical products as well as the underground water reserves, a stylized air, improve the environment of high humidity and beekeeping. These days, protected areas, including national parks are known as one of the most beneficial forms of sustainable productivity and multilateral territories. Maintaining process of fundamental ecologic and wild system, Preservation of watersheds, conservation of genetic diversity, and maintenance of wildlife habitat, planed sits particular endemic and rare plan, maintenance of biodiversity of aquatic and terrestrial environments are the most common benefits of protected areas. In recent researches in field of Floristic studies in arid and semi-arid areas can point to Rechinger and Wendelbo, 1976 and 1985), Reshinger (1977), Leonard (1981-1987), Assadi and Runemark (1983), Asri et al (2003), Kashipazha et al, (2004), Parishani, (2005), Tavakkoli and Mozaffarian, (2005), Nadjafi Tireh-Shabankareh et al. (2005), Saffi Khani et al (2006), Ghahremanan et al (2006). Gonabad's Zone as result of Specific conditions of climate has never been studied. Therefore, in the biological seeding operations, drilling, pile work, work, plant, shrub planting peanuts and tree work is done and in mechanical part of operation of dams metal style, Gabiony dam and river erosion control is proposed. Vegetation and land use map of province and zone of study provide by

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Engineering Administration Department of Natural Resources of Khorasan Razavi (scale 1:100000). In these maps, meadows are shown based on canopy density, cultivated land divided into irrigated, rain fed, and rocky outcrop of land without vegetation and water levels.

Literature review

Despite a general consensus that ongoing landscape transformation is a major threat to species diversity we are still far from knowing the mechanisms behind species decline and loss (Harrison and Bruna 1999), and their consequences for ecosystems (Loreau et al. 2001). So far, much of the research on landscapes and biodiversity has focused on effects of spatial landscape structure on single species and species richness, and has resulted in a growing literature on landscape ecology and conservation (Turner et al. 2001, Bierregaard et al. 2002). A number of important drivers behind species loss have been identified, such as habitat deterioration, reduction of habitat area, increasing isolation of remaining habitats, and increasing susceptibility of fragmented habitats to invasions (Bruun 2000, Loreau et al. 2001, Bierregaard et al. 2002). Species may respond to such changes instantaneously, but there may also be a time lag in the response. One form of delayed response causes an extinction debt (Tilman et al. 1994), implying that the conditions for species persistence are no longer met, although the species are still present. This may cause extinctions in the future, but changing conditions may also give threatened species a chance to recover. Thus, a critical issue for conservation biology is not only to assess the effect of spatial structure on biodiversity, but also to include a temporal scale of the biodiversity response to ongoing landscape transformation (Hanski and Ovaskainen 2002, Foster 2002). Studies of historical land-use effects on present-day vegetation have mostly focused on a local scale, i.e., related aspects of species diversity to site-specific management history (Bellemare et al. 2002, Cousins and Eriksson 2002). A general conclusion is that such site-specific historical effects are common, and that they may reflect land use as far back as several millennia (Eriksson 1998, Dupouey et al. 2002). However, we are not aware of any study that relates present-day diversity to historical landscape structures, extending beyond the spatial scale of the specific sites under study. The main reason why we should expect that historical landscape structure (i.e., surrounding a target site) should influence species diversity is that site connectivity influences colonization and extinction rates at the site. A highly connected site is expected to be comparatively species rich, because colonization is promoted, and possibly because the rescue effect reduces extinction rates. If landscape structure is altered, but local populations at the site are maintained, either as remnant populations (Eriksson 1996) or as stable albeit isolated populations, sites with high historical connectivity will maintain a high diversity in comparison of sites with lower historical connectivity. This will cause a time lag in the response of local species richness to landscape changes even if these changes do not directly influence the conditions at the site where the species occur.

Study area

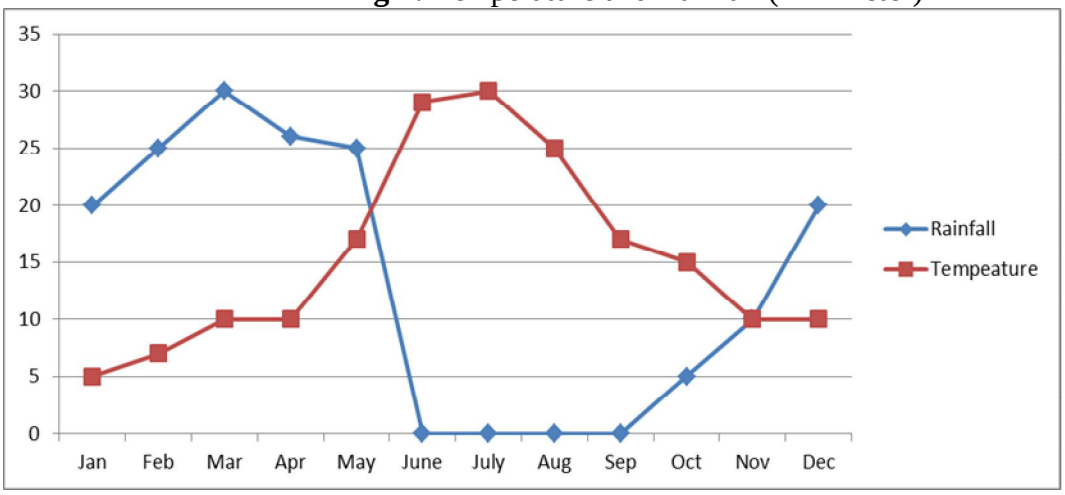
Study area with an area of about 1825020 hectares and coordinates 58^0 30’ N 34^o 35’ E. This area includes maps of Iranian Topography in scale of 1: 250000. Height above sea level is generally high. Minimum height is 513 meters and located in the northwestern region of the salt desert. Maximum altitude is 2863 located at the Siah Mountain in South West of study’s area. This zone located at East of Iran and South of Khorasan Razavi province and it is limited to Torbat-Heydarieh from North and South of the sheet Ghaen, from East to sheet of Taybad and Ferdows’s sheet from West.

Sampling

Geographic studies based on the information obtained from the Department of Natural Resources of Gonabad city. Entire actions like collecting, drying, collection and species identification was based on classical taxonomic methods. Plant samples include diverse species of Gonabad zone during 2007 and 2011. Collecting and studying of diverse species plant do in every 15 minutes in order to precious

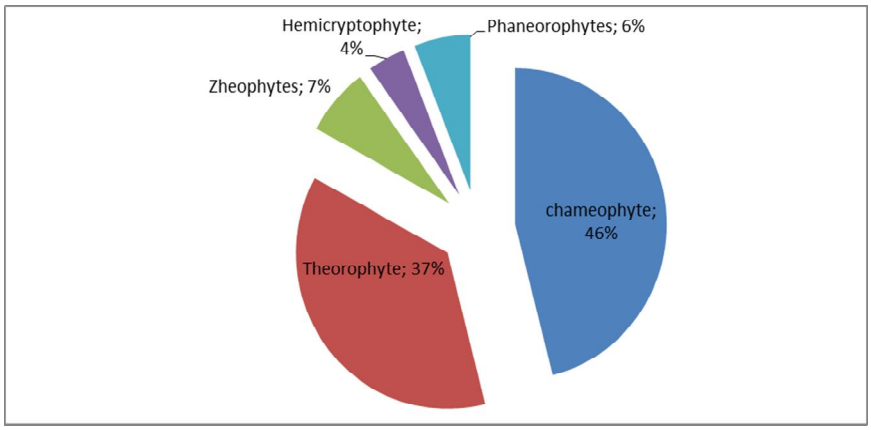
investigate of plant species. Propagation of species of flora used to help identify plants and also Flora of Tyrkey and east Aegean (Davis P.H.,1965-1988), Flora Iranica (Rechinger K.H.,1963-2005), Flora of Iraq (Townsend C.C.,1968-1985), Pictorial flora of Golestan National park (Akhani, 2004), Flora of Iran (Assadi et al 2007), Colorful flora Iran (Ghahreman, 2007), Iranian herb (Mobien, 1995), Classification of plant (Mozafarian, 2000), Trees and shrubs of Iran (Mozafarian, 2004) and Astragalus in Iran (Masomei, 2008).

Fig 1: Temperature and Rainfall (millimeter)



Average annual rainfall of the study area is less than 75.5 millimeter in proximity of the desert and 250 millimeters in the highlands, known as the Siah Mountains in the Southern area. Average temperature fluctuate from 12.5 C in the southern highlands region Kakhk in Kalat to over 19 C in Omran desert.

Fig 1: Relative abundance of plant life forms of Gonabad



Domarten based on annual temperature and precipitation, climate change, introduced a measure to classify climates. He called the proposed measure as stiffness coefficient, which is calculated as follows:

IA=P/T+10

Where:

IA: stiffness coefficient of Domatron

P= Annual rainfall in millimeters

T= the average annual temperature in degrees Celsius

Table 1: Flora, life forms and classes of pasture plants Gonabad

Life forms	Family	Taxon
Ch	Composita	Acantholepis orientalis **Less.**
Ch	**Plumbaginaceae**	**Acantholimon bracteatum** (Girard)
Ch	**Caryophyllaceae**	**Achillea tenuifolia** Lam.
Ch	**Compositae**	**Aegilops crassa** Boiss.
Ge	**Gramineae**	**Aegilops triuncialis** L.
Ge	**Gramineae**	**Aegilops umbellulata** Zhuk.
Ge	**Gramineae**	**Aeluropus littoralis** (Gouan) Parl.
Ge	**Gramineae**	**Agropyrum pectiniforme** Roemer
He	**Gramineae**	**Agropyrum trichophorum** (Link) Richter
Ge	**Gramineae**	**Alhagi camelorum** Fisch.
Ch	**Papilionaceae**	**bracteosa** Boiss. **Alkanna**
Th	**Boraginaceae**	**Allium atroviolaceum Boiss.**
Ge	**Liliaceae**	**Allium cepa** L.
Ge	**Liliaceae**	**Allium eriophyllum** Boiss.
Ge	**Liliaceae**	**Alopecurus textilis** Boiss.
Th	**Gramineae**	**Amberboa nana** (Boiss.) lljin
Th	**Compositae**	**Amberboa turanica** lljin
Ph	**Rosaceae**	**Amygdalus eburnea** Spach
Ph	**Rosaceae**	**Amygdalus scoparia** Spach
Ch	**Euphorbiaceae**	**Andrachne telephioides** L.
Th	**Compositae**	**Anthemispseudocotula**Boiss.
Th	**Compositae**	**Anthemis scariosa** DC.
Th	**Boraginaceae**	**Arnebia bungei** Boiss.
Th	**Boraginaceae**	**Arnebia decumbens** (Vent.) Coss. & Kral
Ch	**Compositae**	**Artemisia scoparia** Waldst. & Kit
Ch	**Compositae**	**Artemisia Sieberi** Besser
Ch	**Papaveraceae**	**Astragalus annullaris** L.
Ch	**Papaveraceae**	**Astragalus arbusculinus** Bornm. & Gauba
Ch	**Papaveraceae**	**Astragalus carducchorum Boiss. & Haussk**
Ch	**Papaveraceae**	**Astragalus ispahanicus** Boiss.
Ch	**Papaveraceae**	**Astragalus obtusifolius** DC.
Ch	**Papaveraceae**	**Astragalus schmalhausenii** Bunge
Ch	**Papaveraceae**	**Astragalus tribuloides** Delile

Ch	**Geraniaceae**	**Avena sativa** L.
He	**Geraniaceae**	**Boissiera squarrosa** Hochst. Ex Steud
G.b	**Podophyllaceae**	**Bongardia Chrysogonum** (L.) Boiss.
Th	**Gramineae**	**Bromus danthoniae** Trin.
Th	**Gramineae**	**Bromus scoparius** L.
G.b	**Umbelliferae**	**Bunium cylindricum** (Boiss. & Hohen.)
Th	**Rubiaceae**	**Callipeltis cucularia** (L.) Stev.
Th	**Compositae**	**Carthamus lanatus** L.
Th	**Compositae**	**Carthamus oxyacantha** M. B.
Th	**Compositae**	**Centaurea Balsamita** Lam.
Th	**Compositae**	**Centaurea Bruguieriana** (DC.) Hand.
Th	**Compositae**	**Centaurea iberica** Trev. Ex Spreng
Ch	**Compositae**	**Centaurea virgata** Lam.
Th	**Chenopodiaceae**	**Ceratocarpus arenarius** L.
Th	**Compositae**	**Crepis sancta** (L.) Babcock
Ch	**Papilionaceae**	**Chesneya astragalina** Jaub. & Spach
Ch	**Compositae**	**Cirsium hygrophilum** Boiss.
Ch	**Compositae**	**Cirsium obvallatum** (M. B.) M. B.
Th	**Cruciferae**	**Conringia perfoliata** (C. A. Mey.) Busch
Th	**Ranunculaceae**	**Consolida regalis** S. F. Gray
Ch	**Convolvulaceae**	**Convolvulus cantabrica** L.
Ch	**Fumariaceae**	**Corydalis verticillaris** DC.
Ph	**Rosaceae**	**Cotoneaster discolor** Pojark.
Ph	**Rosaceae**	**Cotoneaster nummularia** Fisch. & C. A.
Ph	**Rosaceae**	**Cotoneaster ovata** pojark.
Ch	**Compositae**	**Cousinia crispa** Jaub. & Spach
Ch	**Compositae**	**Cousinia macroptera** C. A. Mey.
G.r	**Gramineae**	**Cynodon dactylon** (L.) Pers.
Ch	**Cyperaceae**	**Cyperus rotundus** L.
Ge	**Gramineae**	**Dactylis glomerata** L.
Th	**Cruciferae**	**Descurainia Sophia** (L.) Schur
Th	**Thymelaeaceae**	**Diarthron vesiculosum** Fisch. & C. A.
Th	**Labiatae**	**Dracocephalum kotschyi** Boiss.
Ch	**Umbelliferae**	**Ducrosia flabellifolia** Boiss.
Ch	**Compositae**	**Echinops cephalotes** DC.
Ch	**Compositae**	**Echinops dichrous** Boiss. & Hausskn.
Ch	**Compositae**	**Echinops ritrodes** Bunge
Ch	**Boraginaceae**	**Echium italicum** L.
Th	**Gramineae**	**Eremopyrum distans** (C. Koch) Nevski
Ch	**Labiatae**	**Eremostachys laevigata** Bunge
Th	**Geraniaceae**	**Erodium oxyrrhynchum** M. B.
Ch	**Umbelliferae**	**Eryngium Bungei** Boiss.
Ch	**Umbelliferae**	**Eryngium caeruleum** M. B.
Th	**Euphorbiaceae**	**Euphorbia granulata** Forssk.

Th	**Euphorbiaceae**	**Euphorbia myrsinites** L.
Ch	**Euphorbiaceae**	**Euphorbia petiolata** Banks & Soland.
Ge	**Gramineae**	**Festuca rubra** L.
Ch	**Cruciferae**	**Fibigia suffruticosa** (Vent.) Sweet, Hort.
Ph	**Moraceae**	**Ficus carica** L.
Th	**Frankeniaceae**	**Frankenia pulverulenta** L.
Ge	**Liliaceae**	**Fritillaria olivieri** Baker
Th	**Fumariaceae**	**Fumaria Vaillantii** Loisel.
Ch	**Rubiaceae**	**Gaillonia curcianelloides** A. Rich.
Ch	**Rubiaceae**	**Galium verum** L.
Th	**Compositae**	**Garhadiolus angulosus** Jaub. & Spac
Ch	**Geraniaceae**	**Geranium persicum** Schonbeck-Temesy
Th	**Papaveraceae**	**Glaucium elegans** Fisch. & C. A. Mey.
Ch	**Papilionaceae**	**Glycyrrhiza glabra** L.
Th	**Cruciferae**	**Goldbachia laevigata** DC.
Th	**Compositae**	**Gundelia Tournefortii** L.
Ch	**Papilionaceae**	**Hedysarum kopetdaghi** Boriss.
Ch	**Compositae**	**Heteranthelium piliferum** (Banks & Soland.)
Th	**Gramineae**	**Hordeum spontaneum** C. Koch
Th	**Gramineae**	**Hymenocrater incanus** Bunge
Ch	**Labiatae**	**Hyoscyamus pusillus** L.
Th	**Solanaceae**	**Hypecoum pendulum** L.
Th	**Papaveraceae**	**Iris Barnumae** Baker & Foster
Ch	**Iridaceae**	**Iris Pseudoacorus** L.
Ch	**Iridaceae**	**Iris songarica** Schrenk
Ch	**Iridaceae**	**Ixiolirion montanum** (Labill.) Herb.
G.r	**Amaryllidaceae**	**Ixiolirion tataricum** (Pall.) Herb.
Ch	**Amaryllidaceae**	**Jurinea macrocephala** DC.
G.b	**Compositae**	**Jurinea radians** Boiss.
Ch	**Compositae**	**Koelpinia linearis Pall.**
Ch	**Compositae**	**Lactuca glauciifolia** Boiss.
Th	**Labiatae**	**Lallemantia royleana** Fisch. Et
Th	**Labiatae**	**Lamium album** L.
Th	**Labiatae**	**Lamium amplexicaule** L.
Ch	**Labiatae**	**Lamium Galeobdolon** (L.) L.
Ch	**Podophyllaceae**	**Leontice leontopetalum** L.
Ch	**Cruciferae**	**Lepidium sativum** L.
Ge	**Compositae**	**Ligularia persica** Boiss.
Th	**Plumbaginaceae**	**Limonium Meyeri** (Boiss.) O. Kunt
Ch	**Gramineae**	**Lophochloa obtusiflora** (Boiss.)Gontsch.
Ch	**Gramineae**	**Lophochloa phleoides** (Vill) Reichenb.
Th	**Papilionaceae**	**Lotus corniculatus** L.
Th	**Solanaceae**	**Lycium ruthenicum** Murr.
Ch	**Solanaceae**	**Lycopersicum esculentum** Mill.

Th	Cruciferae	Malcolmia africana (L.) R. Br.
Th	**Labiatae**	**Marrubium astracanicum** Jacq.
Th	**Labiatae**	**Marrubium cuneatum** Russell
Ch	**Cruciferae**	**Matthiola longipetala** (Vent.) DC.
Th	**Papilionaceae**	**Medicago radiata** L.
Th	**Papilionaceae**	**Medicago rigidula** (L.) All.
Ch	**Papilionaceae**	**Medicago sativa** L.
Ch	**Gramineae**	**Melica Jacquemontii** Decne. ExJaquem.
Th	**Papilionaceae**	**Melilotus officinalis** (L.) Desr.
Ph	**Moraceae**	**Morus alba** L.
Ge	**Liliaceae**	**Muscari comosum** (L.) Miller
Ch	**Labiatae**	**Nepeta racemosa** Lam.
Th	**Labiatae**	**Nepeta saccharata** Bunge
Th	**Ranunculaceae**	**Nigella arvensis** L.
Th	**Boraginaceae**	**Nonnea caspica** (Willd.) G. Don
Th	**Boraginaceae**	**Nonnea lutea** (Desr.) Reichenb
Th	**Umbelliferae**	**Oliveria decumbens** Vent.
Ch	**Papilionaceae**	**Onobrychis cornuta** (L.) Desv.
Ch	**Boraginaceae**	**Onosma microcarpum** DC.
Th	**Papaveraceae**	**Papaver Gaubae** Cullen & Rech. F.
He	**Zygophyllaceae**	**Peganum harmala** L.
Th	**Gramineae**	**Phalaris minor** Retz.
Ch	**Gramineae**	**Phleum iranicaum** Bornm. & Gauba
Ch	**Labiatae**	**Phlomis olivieri** Benth.
Ph	**Anacardiaceae**	**Pistacia atlantica** Desf.
Ph	**Anacardiaceae**	**Pistacia khinjuk** Stocks
Ph	**Anacardiaceae**	**Pistacia vera** L.
He	**Plantaginaceae**	**Pistacia vera** L.
Th	**Plantaginaceae**	**Plantago major** L.
Th	**Plantaginaceae**	**Plantago psyllium** L.
G.b	**Gramineae**	**Poa bulbosa** L.
Th	**Umbelliferae**	**Prangos ferulacea** (L.) Lindl.
Ch	**Gramineae**	**Psathyrostachys fragilis** (Boiss.) Nevski
Th	**Cruciferae**	**Pseudocamelina glaucophylla** (DC.) N.
Th	**Plumbaginaceae**	**Psylliostachys spicata** (Willd.) Nevski
Th	**Dipsacaceae**	**Pterocephalus kurdicus** Vatke
Ch	**Polygonaceae**	**Pteropyrum Olivieri** Jaub. & Spach
Ch	**Compositae**	**Pulicaria arabica** (L.) Cass.
Ph	**Punicaceae**	**Punica Granatum** L.
Th	**Ranunculaceae**	**Ranunculus arvensis** L.
Th	**Ranunculaceae**	**Ranunculus asiaticus** L.
Ch	**Cruciferae**	**Rapistrum rugosum** (L.) All.
Th	**Polygonaceae**	**Rumex Acetosella** L.
Th	**Chenopodiaceae**	**Salsola imbricata** Forssk.

Th	**Chenopodiaceae**	**Salsola incanescens** C. A. Mey.
Th	**Chenopodiaceae**	**Salsola jordanicola** Eig
Th	**Chenopodiaceae**	**Salsola lachnantha** (Botsch.) Botsch.
Ch	**Labiatae**	**Salvia atropatana** Bunge
Ch	**Labiatae**	**Salvia compressa** Vent.
Ch	**Labiatae**	**Salvia limbata** C. A. Mey.
Ch	**Labiatae**	**Salvia multicaulis** Vahl
Ch	**Labiatae**	**Salvia Sclarea** L.
Th	**Dipsacaceae**	**Scabiosa Olivieri** Coult.
He	**Compositae**	**Scariola orientalis** (Boiss.) Sojak
Ch	**Labiatae**	**Scutellaria pinnatifida** A. Hamilt.
Ch	**Labiatae**	**Scutellaria theobromina** Rech. F.
Ch	**Gramineae**	**Secale montanum** Guss.
Th	**Compositae**	**Seneciopseudo-orientalis** Schischk.
Th	**Caryophyllaceae**	**Silene conoidea** L.
Ch	**Cruciferae**	**Sisymbrium irio** L.
Th	**Solanaceae**	**Solanum melongena** L.
Ch	**Labiatae**	**Stachys lavandulifolia** Vahl
Th	**Gramineae**	**Taeniatherum crinitum** (Schreb.) Nevski
Ch	**Compositae**	**Tanacetum Balsamita** L.
Ch	**Compositae**	**Tanacetum kotschyi** (Boiss.) Griersonb
Ch	**Compositae**	**Tanacetum parthenium** (L.) Schultz-Bip
Ch	**Compositae**	**Tanacetum polycephalum** Schultz-Bip.
Ch	**Compositae**	**Taraxacum syriacum** Boiss.
Ch	**Compositae**	**Taraxacum vagum** V. S.
Ch	**Labiatae**	**Teucrium orientale** L **.**
He	**Labiatae**	**Teucrium polium** L.
Ch	**Cruciferae**	**Thlaspi perfoliatum** L.
Ch	**Labiatae**	**Thymus kotschyanus** Boiss. & Hohen.
Ch	**Cruciferae**	**Torularia torulosa** (Desf.) O. E. Schulz
Ch	**Compositae**	**Tragopogon erostris** Boiss. & Haussk.
Ch	**Compositae**	**Tragopogon vaginatus** M.Ownbey & Rech.f
He	**Boraginaceae**	**Trichodesma incanum** (Bge.) A. DC.
Ch	**Compositae**	**Tripleurospermum disciforme** (C. A. Mey.) schultz-
Ge	**Liliaceae**	**Tulipa montana** Lindl.
Th	**Caryophyllaceae**	**Vaccaria pyramidata** Medicus
Ch	**Scrophulariaceae**	**Verbascum kochiforme** Boiss. & Hausskn.
Ch	**Scrophulariaceae**	**Verbascum pseudo – Digitalis Nab.**
Ch	**Scrophulariaceae**	**Verbascum sinuatum L.**
Th	**Scrophulariaceae**	**Veronica persica Poir.**
Th	**Scrophulariaceae**	**Veronica punalense**
Ch	**Papilionaceae**	**Vicia variabilis Freyn & Sint.**
He	**Labiatae**	**Ziziphora clinopodioides Lam.**

Ch	**Zygophyllaceae**	**Zygophyllum fabago L.**

RESULTS AND DISCUSSIONS

Gonabd's zone is located in North of Lut desert and it is one of arid and deserts areas in Iran. The region has climate limits such as low rainfall, improper distribution with high annual coefficient of changes, potential evaporation and transpiration, low relative humidity of air, large differences in day and night temperatures, high sunshine hours, Strong and corrosive winds and low cloud cover. These consitions lead to limitations for plant and consequently lead to reduction of biological production and the lack of development of towns and villages. Chamaephytes frequency region implies the existence of hot and dry weather conditions in the region, however, Therophytes also have 37% frequency and they have the second rank. It might be due to destructions in the zone and recent drought, lack of rainfall and a short growing season of the plants. The population density in the area about 0.16 people per square kilometer, the average household share of farmlands and orchards approximately 2.5 hectares also Average number of livestock in rural households, about 70 animal unit and Average number of livestock of nomadic is almost 170 animal units (such as, camels, goats and sheep). Approximately 63% of the total area's Gonabad applicable for composition of pasture plants prevailing drought-friendly, passion, love, and stucco is like dry desert areas.

Conclusion

Based on collected plant in different years in area which is studied; growth 210 species and subspecies belonging to 131 genera and 34-plant family. In among the life forms of plants, Chameophyte includes 46% of plant's zone and it has the highest share of the biological spectrum and after that Therophyte had 37%, Zheophytes, Hemicryptophyte and Phanerophytes had 7, 4, 6 respectively.

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