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RESEARCH ARTICLE

EVALUATION VEGETATION COVER IN SULAYMANIYAH REGION OF IRAQ.

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Abstract

Vegetation is the basic rule in the food pyramid for all living being one of the most important ecosystems, including its content from all plant species , that through the process of photosynthesis by using solar energy where absorbs carbon dioxide and produce oxygen which needed to breathe all forms of life on earth and prevent global warming ,is one of the most important ecosystems in the filtration for rid the air from toxic gases and dusts, maintaining the proper temperature for life especially in reducing the thermal differences between night and day.Organic components of plants turn into nutrients in the soil by microorganisms, maintain the moisture and the water cycle in the soil. Bring rain, prevent the phenomena of soil erosion and desertification so contribute organization of the wind and the movement of clouds and rains then their distributed on the surface of the earthalso protect the biodiversity from extinction. Vegetation provides the humannatural resources which used as a food and Clothing so provides primary natural resources were necessary for the Pharmaceutical Industries, provides resources as raw materials for manufacturing, vegetation is one of the most important sources of the components of biological and ecological balance, which sits on their head the human, in addition of plant breeding andAesthetic values. Thebotanical survey revealed that these plants belong to 39 families, 85genuses and 92 species. While the percentage of coverage was 95 % and plant density reached 395.48 plant/m^2. The higher density found in *Avena fatua*26plant/m^2, the less density was in*Paspalum distichum* 0.15 plant/m^2.The higher frequency in the *Lolium rigidum* 70%, ,the less frequency was in *Anchusa itali*3.5%,the higher height was in*Silybum marianum*102 cm and the less height in*Oxalis corniculata* 18 cm .This region is rich in flora (vegetation cover) which could be invested for anti-desertification, soilprotectionand improvement of natural pastures.

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Introduction:-

Vegetation structure is as important as climate in shaping ecosystem functioning in study region. Maintaining and enhancing vegetation cover and species richness, particularly in grassescould reduce the adverse effects of climate change on ecosystem functioning in these ecosystems [1].Ecological factors play a fundamental role in vegetation In particular; germination, growth and distribution. Flora is adapted to the ecological conditions everywhere, such as dry land plants, semi dry land plants or xerophytes and hydrophytes. The land cover varies according to their regions of growth or distribution. Botanical survey is important to investigate the vegetation cover at a certain area and to know the families, genuses and species of plants and further information about plant density, frequency and the area covered with plants. Also to investigate the type of plants such as the medicinal plants, pasture plants and those used to control desertification phenomenon. On an area basis, herbs contribute significantly to the world's land surface and an important share is devoted to grazing. Management of these areas alters drastically their natural characteristics with increasing livestock; pressure on natural and semi-natural rangelands is also increased. But not all range types have the same production potential. Destruction of floramainly related to overpopulation. To enhance food production, grasslands possessing fertile soils have been ploughed and converted to agricultural lands. Three syndromes, i.e., desertification, deforestation are inherent to global grazing. These syndromes have widespread and differential effects on; the structure, flora diversity,hydrology, biosphereand atmosphere exchange ecosystems as well as represent a major component of global environmental change. Managing the vegetation represents a major shift in thinking and practice. In some parts of the world leading many to believe this is the required stimuli to develop sustainable flora management approach. There is an increasing need for better management of herbs in developing countries in view of the alarming depletion causing by population pressure, agricultural expansion, and misuse of rangelands. Basic to the implementation of any vegetation management strategy, whether it is for assessment and allocation to sustainable uses or for rehabilitation of grasses and denudate lands, is a clear understanding of how much natural resources there are, where they are located, and their present condition. Knowledge of the flora and its geographical environment are essential for proper planning of sustainable vegetation management. To meet those requirements, precise and up-to date information regarding the status of the flora and potential of vegetation rehabilitations important to upgrade and to design proper management for future improvement of the green cover. Several studies reported successful mapping of vegetation in arid and semi-arid environments as well as in temperate areas based on remotely sensed data. In tropical and subtropical areas, attempts to classify land cover have been performed. In the study area, raring cattle are a very important economic activity and continuous grazing all year round is possible at almost all sites. Hence, precise land-cover information and a quantification of the study area are required. Several studies conducted in the north of Iraq from these; where made a survey on natural plants in the Duhok area northern region of Iraq and identified 17 families, 43 genuses, 219 species and found that the average coverage was 70.1% and the density 129.9 plant/$m^2$and concluded that this region contains a wide variety of herbaceous plants, which could be used as pastures [2]. Another study made a survey on different regions in north Iraq such as Sinjar , Atrosh, Zawita and West of Mosul in Sinjar found that the first two regions have a good cover of plants because of the annual rainfall which reach 600 mm, while the latter was poor due to the low rate of rainfall about 300 mm/y, in addition to the severe grazing by animals[3].So others reported that the northern region of Iraq is very rich in vegetation cover which consider a great inhabitantto achieve interaction between organisms, for addition toaesthetic and tourism value for the flora[4].

Materials and Methods:-

This study was conducted in the Sulaymaneyah city 350 km north east of Baghdad, by25 random samples were taken at 0.25 m^2 each asfollows; a woodensquare by dimensions 50x50 cm were used, thrown randomly and counting the plants inside the square then counting the covered area with plants in the square in each sample.It has been diagnosed with identification of plants inside the square, and counting the number of each type in the sample after diagnosed the families, genuses and species. Where the following characters were studied; frequency, height and density on a one squared meter basis for each samples of plants as the methods which followed by the researchers stated in their sources [5-11].

Results and Discussions:-

Sulaymaneyah is the biggest Governorate of Kurdistan Region of Iraq, located north east of Iraq on a border with Iran of geographic coordinate Latitude and Longitude 35°33′40″ and 45°26′14″ respectively. The elevation of Sulaymaniyah center is about 830 m above sea level [12]. The geographic location of Sulaymaniyah Governorate imposed a dry and warm summer for the period June, July, and August, with temperature of 31.5 (°C) as an average summer temperatures for the studied period. The city is usually windy during winter and there are spills of snow

falling sometimes. Where extends from December till February. However, the temperature in the winter season is about 7.6 (°C). The average relative humidity for summer and winter are 25.5% and 65.6% respectively, while the evaporation reached 329.5 (mm) in summers and 53 (mm) in winters. The annual rainfall rate reaches about 656.05 mm, therate of annualtemperature19.6 c^0, the annual rate of humidity45% and the amount rate of annual evaporation 162.7mm as in table (1).The nature of the alluvial soil and its fertility all these factors enhanced the growth and good distribution of the vegetative cover in this area .The botanical species as in table (2) refers to about 39 plant families, 85 genuses and 92 species. While the percentage of coverage was 95 % and plant density reached 395.48 plant/m^2 in the study region. The most abundant family is the*Poaceae*,*Fabaceae*,*Asteraceae (Compositae)*,,and the *Brassicaseae* family. The percentage ratio of these families to the other families; 54.0, 51.0, 42.6 and40.4 % respectively. It is worth to know that this area contains a lot of flora as pasture plants used as forage or animal food, supported by the favorable conditions for growth where consider the region as tourism site. Similar studies were carried in north of Iraq found similar results [13, 14, 15].The highest percentage in the area was 95% and the minimum was 75%. There is a reduction in this character due to the continuous tillage, agricultural operations, overgrazing, logging, firing, urbanization, and weed control. If this area is left without any operations the expected coverage will reach 100%,The reason of riches of flora in study region due to the northern of Iraq in special Sulaymaneyah had being high values of mean annually rainfall 717.0 mm in comparing with the middle Iraq in Baghdad 256.4 mm and southern Iraq in Basra 143.7 mm in the year of 2013 this due to suitable conditions and fertile soil[16]. In study found that the coverage percentage in Zawita region was 70.1%, while found that it was 50.9, 73.7 and 22.2% in Atrosh, Zawita and Sinjar regions respectively[3].In current study the botanical density rate reached 395.48 plant/m^2, table (3) which shows the density, frequency and height of each species of plants.The higher density found in *Avena fatua* 26 plant/m^2,the less density was in *Paspalum distichum* 0.15 plant/m^2. The higher frequency in the *Lolium rigidum* which reached 70%the less frequency was in *Anchusa itali* 3.5 %.It is obvious from that the dominant plants were those available with high frequency, which is due to good environmental conditions in the research region. Plant height of winter plants was in high height because the study was started during the spring at the peak of growth, while in summer plants the real height was measured at the proper time because they continue growth until mid or the end of summer. The biggest height was found in Milk thistle,*Silybum marianum* 102 cm, while the less height was in*oxalis plant* 18 cm. The main purpose of studying plant height is to know the nature of growth of the flora in this region. The Welt weight measurement gives indicators about water, nutrient absorption from the soil and how vegetation contributes to the loss of moisture from the foliage to the atmosphere that is improving the situation climatic which reached on the level one meter squire 5.840 kg. their 4.220kg/m^2 wide leaves plants and 1.620kg/m^2 narrow leaves plants from them, that the dry weight measurement indicated to ability of vegetation to extract soil nutrient and their transmutationby photosynthesis process to organic matter by solar energy, reached 840.00 gm./$m^2$from their 680gm./m^2 wide leaves and80.00gm./m^2 narrow leaves .The following equations used to account the values of flora characters.

$$\text{Density} = \frac{\text{No. of plants in certian species of all samples}}{\text{total no. of samples}}$$

$$\text{Frequency percentage} = \frac{\text{No. of samples containing the species}}{\text{Total no. of samples}}$$

Table 1:- Average monthly value of the climate elements Sulaymaneyah station 2002-2012.

Month	Temp.c^0	Humidity (%)	Evaporation(mm)	Rainfall(mm)
October	22.3	43.8	141.6	38.22
November	14.0	57.2	72.6	63.50
December	8.4	61.2	51.4	81.80
Jan.	6.5	70.3	53.4	124.40
Feb.	7.8	65.4	54.1	125.10
Mar.	12.8	54.9	97.1	88.10
Apr.	17.3	55.1	132.8	95.19
May	24.0	41.6	226.4	37.89
June	29.6	26.4	312.4	0.57
July	31.8	25.2	252.6	0.00
Aug.	33.22	24.9	323.9	0.02
Sep.	28.0	28.4	234.7	1.26
Annual average	19.6	45.0	162.7	Annual total(656.05)

Table 2:- Natural plants growing in the area of work according to their families, genus's and species.

Families	*Genuses and Species*
Poaceae	*Aegilopscrassa; Alopecurusmycosuroides; Avenafatua; Bromus spp.; Cynodondactylon; EragrostisCillanensis; Heterantheliumpiliferum; Hordeumglaucum; Hordeummarianum; Loliumrigidum; Loliumtemulentum; Paspalumdistichum; Phalaris minor; Phragmitescommunis; Poabulbosa; Polypogonmonspeliensis; Sorghum halepense; Taeniatherumasperum*
Fabaceae	*Alhagimaruorum; Astragulus spp.; Coronillascorpiodes; Glycerhizaglabra; Medicagohispida; Melilotusindicus; Onobrychus crista-galli; Pisumsativum; Scorpiurnssulcata; Trifoliumpurpureum; Trifoliumresupinatum; Viciaangustifolia; Vicianarbonensis; Hippocrepisunisiliquosa; Lathyrusannus; Lagonychiumfarctum; Lotus coriculatus*
Asteraceae	*Aster sapalatus; Carduuspyconocephala; Cartharnusoxycanthus; Centaureacynaus; Centaureapallecscens; Echinnopsgalalensis; Lactucascariola; Matricariachamomilla; Matricariaaurea; Silybummarianum; Sonchusoleraceus; Xanthium strumarium*; *Asparagus officialis*
Brassicaceae	*Capsella bursa-pactoris; Cardariadraba; Raphanusraphanastrum; Sinapisarvensis; Sisymbriumirio*
Ammiaceae	*Ammimajus; Ammivisnaga*
Amaranthaceae	*Amaranthuscandatus*
Apiaceae	*Torilisleptophylla*
Boraginaceae	*Anchusaitali*; *Boragoofficinalis*
Caryophylaceae	*Vaccariapyramidata*
Chenopodiaceae	*Chenopodiumalbum,Che. murale*
Convolculaceae	*Convouulusarvensis*
Cuscutaceae	*Cuscutapalaestina*
Cyperaceae	*Achilleafragrautissima; Cyperusrotundus*
Dipsaceae	*Cephalariasyriaca*
Euphorbiaceae	*Chorosophoraverbascifolia*
Fumariaceae	*Fumariaofficinalis*
Geraniaceae	*Erodiummalacoides*
Liliaceae	*Allium vineale;Allium sativum;Eremurusspectabilis*
Malvaceae	*Malvaparviflora,M.Rotundifolia*
Oxalidaceae	*Oxalis corniculata*
Papaveraceae	*Papaverrohose*
Plantiginaceae	*Plantagolanceolata*
Polygonaceae	*Polygonumaviculare; Rumexmatitimus;Rumexdentatus*
Portulaceae	*Portulacaoleracea*
Primulaceae	*Anagallisorvensis*
Ranunculaceae	*Ranunculus asiaticus*
Rubiaceae	*Galiumtricorne*
Solanaceae	*Hyosyamusreticulatus; Solanumnigrum*
Urticaceae	*Urticaurens;Urticadioca*

Liliaceae	*Asparagus officinalis*
Pteridaceae	*Adiantumcapillus-veneris*
Araceae	*Arum maculatum*
Cucurbitaceae	*Citrulluscolocynthis*
Lauraceae	*Cinnamomum cassia (*
Iridaceae	*Crocus sativus*
Lamiaceae	*Lavandulaangustifolia*
Rosaceae	*Prunusdulcis*
Fagaceae	*Quercusinfectoria*
Zingiberaceae	*Zingiberofficinale*

Table 3 :- Shows some characters for flora in the region research.

Scientific name	Frequency %	Density plant/m^2	Height/ cm
Avena fatua	**55**	**26**	**74**
Lolium rigidum	**70**	**17**	**62**
Phalaris minor	**54**	**12**	**53**
Polypogonmonspeliensis	**18**	**7**	**40**
Sorghum halepense	**25**	**8**	**61**
Poabulbosa	**15**	**5**	**25**
Bromus sp.	**17**	**4**	**35**
Cynodondactylon	**15**	**7**	**26**
Eragrostiscilianensis	**14**	**0.27**	**33**
Heterantheliumpiliferum	**4.5**	**0.37**	**36**
Hordeumglaucum	**35**	**16**	**72**
Hordeummarianum	**28**	**12**	**30**
Paspalum distichum	**3.7**	**0.15**	**39**
Taeniatherumasperum	**3.7**	**0.57**	**32**
Polygonumaviculare	**18**	**3.93**	**36**
Rumexmaritinus	**4.4**	**0.16**	**19**
Rumexdentatus	**7**	**1.3**	**21**
Portulacaoleracea	**3.6**	**0.71**	**32**
Anagallisarvensis	**45**	**12**	**19**
Ranuculusasiaticus	**3.7**	**5.72**	**28**
Gallium tricorne	**25**	**5.10**	**31**
Hyposcyamus reticulates	**14**	**1.65**	**39**
Solanumnigrum	**7.1**	**2.3**	**37**
Alopecurusmyosuroides	**4.2**	**0.31**	**49**
plantagolanceolata	**4.3**	**0.21**	**26**
Papaverrohose	**5.6**	**0.51**	**35**
Oxalis corniculata	**4.2**	**1.46**	**18**
Malvepaviflora	**18**	**1.62**	**22**
Malvarotandifolia	**22**	**1.91**	**24**
Allium veneale	**3.9**	**0.16**	**35**
Erodeummalacoides	**6.5**	**0.71**	**30**
Fumariaofficinalis	**11**	**0.61**	**25**
Vicianarbonensis	**7.8**	**0.92**	**36**
Viciaangustifolia	**36**	**5**	**33**
Trifoliumresupinatum	**39**	**22**	**30**
Trifoliumpurpureum	**6.9**	**2.17**	**31**
Scorpiurussulcata	**3.6**	**0.27**	**22**
Pisumsativum	**12**	**0.62**	**31**
Onobrychis crista-galli	**11**	**3**	**24**
Melilotusindicus	**38**	**19**	**32**
Medicagohispida	**51**	**23**	**30**

Lotus coriculatus	**24**	**10**	**28**
Lathyrusannus	**26**	**0.61**	**27**
Lagonychiumfarctum	**27**	**0.32**	**33**
Hippocripsunisilquosa	**4.9**	**0.16**	**34**
Glycerrhizaglabra	**4.7**	**0.61**	**57**
Coronillascorpoides	**4.5**	**0.17**	**27**
Astragulus sp.	**7.6**	**1.35**	**37**
Alhagimaurorum	**14**	**0.97**	**32**
Chrosophoraverbascifolia	**6.9**	**1.32**	**25**
Cephalariasyriaca	**6.9**	**0.69**	**45**
Cyperusrotundus	**4.4**	**0.75**	**30**
Achilleafragrantissima	**6.9**	**1.38**	**32**
Cuscutapalestina	**9**	**0.31**	**91**
Convolvulus arvensis	**14.2**	**3.82**	**51**
Chemopodium album	**5.6**	**0.42**	**31**
Chemopodiummurale	**6.8**	**0.55**	**29**
Vaccariapyramidata	**5.9**	**2.77**	**44**
Sinapisarvensis	**14.2**	**0.61**	**59**
Raphanusraphanistrum	**45**	**5.85**	**51**
Cardaridraba	**12**	**1.36**	**31**
Capsella bursa-pastoris	**55**	**12.80**	**32**
Anchusaitalica	**3.6**	**2.15**	**70**
Xanthium strumarium	**4.7**	**0.53**	**30**
Sonchusoleraceus	**28**	**2.15**	**31**
Silybum marianum	**50**	**4.85**	**102**
Matricariaaurea	**11**	**0.81**	**21**
Matricariachamomilla	**40**	**4.52**	**31**
Lactucascariola	**54**	**12**	**33**
Echinopsgalaensis	**3.9**	**0.28**	**49**
Centaureacyanus	**4.4**	**0.42**	**36**
Centaureapallescens	**30**	**3.41**	**30**
Carthamusoxycanthus	**39**	**4.60**	**32**
Carduuspycnocephala	**18**	**1.43**	**55**
Aster supalatus	**29**	**9**	**51**
Ammimajus	**64**	**13**	**34**
Anchusa itali	**3.5**	**3.43**	**30**
Ammaranthuscaundatus	**15.5**	**11**	**36**
Torilisleptophulla	**12**	**3.47**	**35**

Recommendation and Conclusion:-

1. Sulaymaneyah area characterize by excellent vegetation cover because of the prevailing environmental conditions such as ; climate rainfall , fertile soil and should be preserve the flora from the decline and extinction which clear its importance in the maintenance of soil from erosion and desertification so preventing damage that affects them which listed below:

2. Vegetation cover integrated investigating ecosystem where achieve the case of biological diversity between organisms and has been environmental,pastoral,aesthetic, medical and health important so requires sustainability and continuity their qualifying.
3. Observed stripping the land cover in the study area by the mechanicalmanner in the flowering season and this hinders formation of seed and re-self-seeding.
4. In the study area uses a lot of herbicides to control the flora which considers by population as weeds that controlledin the early growing stages this effect on seeds formation.
5. The burning process continuously status to get rid of the vegetation cover after drying must therefore be prevented in the summer this year 2016 the fires affected on large areas of flora and forests.

6. The citizens grazingthe animals in the wildherbs where gets overgrazing of natural pastures, especially at the flowering stage which affects on their sustainability.
7. Require expansion the natural reserves to achieve interaction status between living natural resources and non-living natural resources.
8. Urbanization has a significant effect on the destruction of vegetation in the region should move towards vertical construction.

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