
ORIGINAL ARTICLE

Morphological and anatomical studies for some species of *Lotus* L. (Fabaceae)

Khansaa Rasheed Al-Joboury

Iraq Natural History Research Center and Museum, University of Baghdad, Baghdad, Iraq

ABSTRACT

Morphological, anatomical and flowering and fruiting period studies suggested to provide us more detailed descriptions for the three species of the genus Lotus L. (Fabaceae). This species are: Lotus halophilus Boiss. & Spruner, Lotus gebelia Vent. and Lotus corniculatus L. Different characteristics were found in the examined species. In morphological aspect was studied, The maximum value to each of stem length ranged 10-70 cm which recorded for the species L. corniculatus and but the lowest range recorded in Pedicels length in the species L. halophilus which ranged 0.5 – 0.8mm. In flowering and fruiting period studies found that the perfect period for the species L. halophilus was between march to may while the other specie L. gebelia the perfect period between may to august but in the species L. corniculatus the perfect period between May to June. The aim of this study is to identify the general and accurate characteristics which contribute for putting taxonomic keys for the species studied.

Keywords: Lotus L. – Fabaceae – Morphology - anatomy- species

Received 29.09.2019

Revised 21.10.2019

Accepted 17.11.2019

How to cite this article:

Kh. R. Al-Joboury. Morphological and anatomical studies for some species of *Lotus* L. (Fabaceae). Adv. Biores., Vol 10 [6] November 2019. 151-154.

INTRODUCTION

Lotus L. (Fabaceae) which it is one of the very large plant families for the flowering plants, after Compositae and Orchidaceae [1]. That contains about 720 genera and about 18,000 species worldwide. Also it is the largest genus for the tribe Loteaeis, and is complicated in taxonomy, It is one of the genus divided to subgenera and split to segregate genera, but no consistent consensus [2,3]. *Lotus* L. was a well-known water plant in Asia, and it spread along the boundaries Iran and the Caspian Sea eastwards and continue to China and Japan, also southeastwards continued along India and Indo-China, also to northern Australia. Several studies were used the morphological and anatomical characters to differentiate between some taxa of Leguminosae [4,5]. The aim of the present work is to find out the morphological and anatomical features of leaves, stem, flower, seeds for species of this genus.

MATERIALS AND METHODS

Morphological characteristics: Samples for the mature leaves, stems, and roots of *Lotus* L. were collected from some areas in Baghdad. So the species identified using available references [6].

Anatomical characteristics: The anatomical sections of fresh samples for leaves and stems completed in Iraq natural history research center and museum, university of Baghdad, It was used hand sectioning method. [7]

flowering and fruiting period by the observation for the flowering and fruiting period for each species.

RESULTS AND DISCUSSION

Table 1: Systematic Classification of Lotus L. (Fabaceae)

Kingdom	Plantae
Division	Angiospermsae
Class	Rosids
Order	Fabales
Family	Fabaceae
Genus	<i>Lotus</i> L.

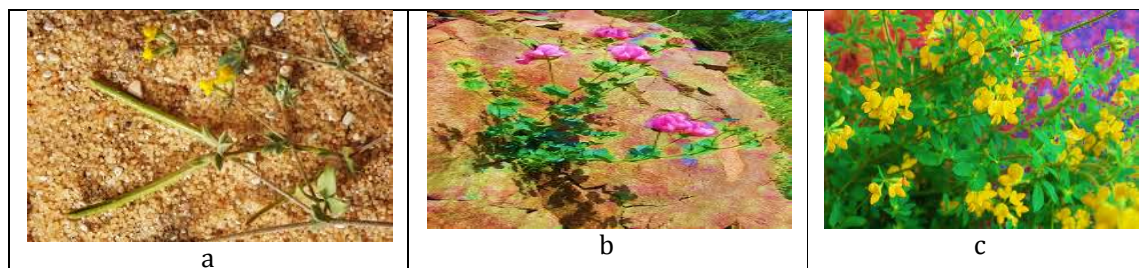


Figure 1: Morphological features of species of the three genus Lotus L. (Fabaceae): a: *L. halophilus*, b: *L. gebelia*, c: *L. corniculatus*

Table 2. Morphological features of the three species.

Species	Habit	Stem cm	Leaflets mm	Pedicels mm	Corolla			Pod mm	Seed mm
					Standard mm	Wings mm	Keel mm		
<i>L. halophilus</i>	annual	5-20	2-7 X 1-4	0.5 – 0.8	5-8	2-4	2-3	15-30	1
<i>L. gebelia</i>	perennial	20-50	10-20 x 5-9	1	15-19	10-12	5-7	25-40	2
<i>L. corniculatus</i>	perennial	10-70	5-20 x 3-10	1	10-16	10-12	8-10	12-25	2

In *Lotus* L. which belong to Fabaceae (table 1) Morphological characteristics in the studies for the three species are explained in table (2).the external and internal morphological features which finding In the species being studied *L. halophilus* was slender, prostrate, decumbent or ascending annual, much branched from the base, and the length of stem, leaves, pedicels, petals and fruit for this plant species was measured. The species *L. halophilus* recorded the range 5-20 cm in the stem length and the leaves were small while the leaflets recorded the range 2-7 X 1-4mm, obtuse, also the flowers pale yellow, solitary, pedicels very short ranged 0.5 – 0.8 mm. The pod was linear, straight or curved towards the tip and the seed yellow, smooth, 1mm. This data agree with [8,9,10]. It was found according to the results of the study that the species *L. gebelia* was perennial and the stem length ranged 20-50 cm, branching erect, and glabrous. In this species we find the measurements for the leaflets were 10-20 x 5-9 mm and the Pedicels were 1 mm, the pods ranged 25-40 mm but the seeds were 2 mm. And finally the results for the species *L. corniculatus* were prostrate, ascending or decumbent perennial and stem length ranged 10-70 cm, the leaflets were 5-20 x 3-10 mm, the pedicels were 1mm, The pods ranged 12-25 mm. The cross sections of the three species for leaflets showed that a thin layer of cuticle for *L. halophilus* ranged was 4.33 µm covered the uniseriate epidermal cells which was 44.65µm, So the adaxial and abaxial epidermis of this species have anomocytic stomatal complex. Mesophyll was bifacial of palisade layer thickness and spongy layer which it thickness was 105.66µm. But the cross section for the leaflets of *L. gebelia* has cutical thickness about 2.65 µm which covered the oblong ovate uniseriate epidermal cells which 36.73 µm, So palisade cells thickness was 73.27µm. But we observed that the spongy cells recorded 111.65 µm. The third species was *L. corniculatus* which recorded 2.82 µm in cuticle thickness and 31.65 µm in adaxial epidermis thickness and 97.42 µm in palisade cells thickness and 104.55 µm in spongy cells thickness (fig. 3). This data agree with [11,12,13,14].

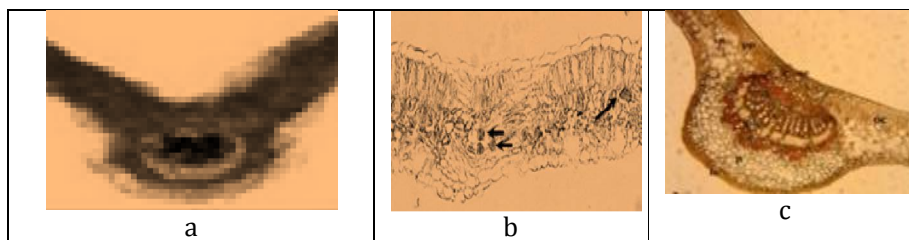


Figure 2: Anatomical features of the three species of Lotus L. (Fabaceae): a: *L. halophilus*, b: *L. gebelia*, c: *L. corniculatus* (520X)

Table 3. Anatomical features of the leaves of the three species

Species	cutical	adaxial epidermal thickness	mesophyll		vascular tissue+ sclerenchyma
			palisade cells	spongy cells	
<i>L. halophilus</i>	4.33	44.65	86.54	105.66	275.88
<i>L. gebelia</i>	2.65	36.73	73.27	111.65	244.83
<i>L. corniculatus</i>	2.82	31.65	97.42	104.55	223.47

In flowering and fruiting period studies found that the perfect period for the species *L. halophilus* was between march to may while the other specie *L. gebelia* the perfect period between may to august but in the species *L. corniculatus* the perfect period between may to June (Fig. 3).

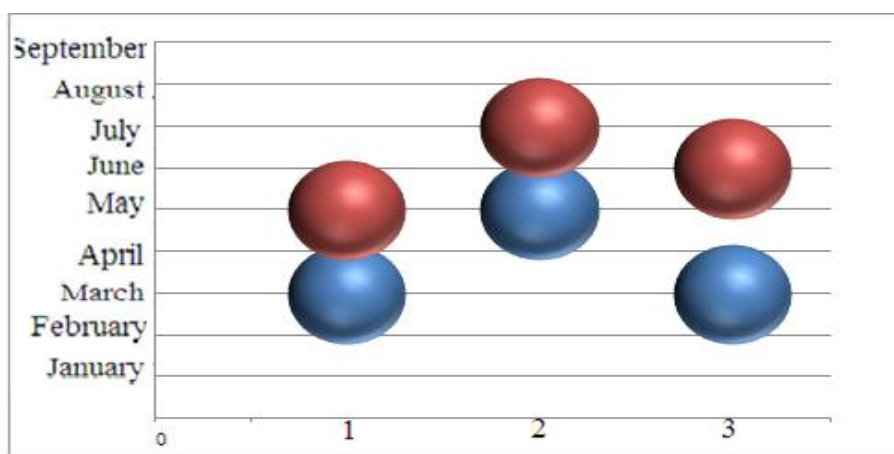


Figure 3. flowering and fruiting period of the three species of Lotus L. a: *L. halophilus*, b: *L. gebelia*, c: *L. corniculatus*

REFERENCES

1. Kramina T. E. (2000): A new species of the genus Lotus L. (Leguminosae) from L. corniculatus L. group. Bull. Moscow Soc. Natur., Biol. Ser. 105(1): 35- 40.
2. Zorić L, Merkulov L, Luković J, Boža P (2010). Comparative seed morphology of Trifolium L. species (Fabaceae). Period Biol 112: 263-272.
3. Lewis GP, Schrire B, Mackinder B, Lock M (2005). Legumes of the World. Kew, UK: Royal Botanic Gardens
4. Allan G.J., Francisco-Ortega J, Santos-Guerra A, Boerner E. And Zimmer E.A. 2004. Molecular phylogenetic evidence for the geographic origin and classification of Canary Island Lotus (Fabaceae: Loteae). Molecular Phylogenetics and Evolution, 32, 123-138.
5. Degtjareva G, Kramina T, Sokoloff D, Samigullin T, ValiejoRoman C, Antonov A (2006). Phylogeny of the genus Lotus (Leguminosae, Loteae): evidence from nrITS sequences and morphology. Botany 84: 813-830.
6. Townsend, C. and Guest, E. 1980. Flora of Iraqi. Vol.4. Ministry of Agriculture and Agrarian reform. Baghdad. Iraqi.
7. Metcalf C, Chalk L. 1950. Anatomy of the Dicotyledons (Leguminosae): Leaves, Stems and Wood in Relation to Taxonomy with Notes on Economic Uses. Oxford, Clarendon Press, 1, 153.
8. Mirzaei L, Assadi M, Nejadstari T, Mehregan I (2015). Seed surface morphology in some species of the Colutea L. (Fabaceae) in Iran. Advances in Bioresearch 6: 105-109
9. Kramina T, Sokoloff D (2004). A taxonomic study of Lotus australis complex (Leguminosae), with special emphasis on plants from Pacific Ocean islands. Adansonia 26: 171-197.

10. Yagueddú C, Comparatore V, Paoletti G (2009). Identification of six Papilionaceae species by epidermal characteristics: microanalysis of hand composed mixtures. *Boletín de la Sociedad Argentina de Botánica* 44: 305-315.
11. Kasem W. (2016). Anatomical, Pollen Grains and Seed Exomorphic Studies on Five Species of *Cleome* L (Cleomaceae Bercht. & Presl) Collected from South West of Saudi Arabia. *J. of Plant Sciences*. 4, 29-36.
12. Zoric L, Merkulov L, Lukovic J, Boza P. (2012). Comparative analysis of qualitative anatomical characters of *Trifolium* L. (Fabaceae) and their taxonomic implications: preliminary results. *Plant Systematic and Evolution*. 298, 205-219.
13. Siahpoosh A, Ghasemi M, Majd A, Rajabi H, Nejadstattari T. (2015). Vegetative and reproductive anatomy of *Vignaradiata* L. *journal of Tropical plant research*. 2, 23-29.
14. Zoric L, Merkulov L, Lukovic J, Boza P. (2012). Comparative analysis of qualitative anatomical characters of *Trifolium* L. (Fabaceae) and their taxonomic implications: preliminary results. *Plant Systematics and Evolution*. 298, 205-219.

Copyright: © 2019 Society of Education. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.